

# **Muelleria**

**Volume 5**

**Numbers 2 & 3**

**March, 1983**

**NATIONAL HERBARIUM OF VICTORIA**

**DEPARTMENT OF CROWN LANDS AND SURVEY**



# Muelleria

Volume 5, Number 2

September to December, 1981

## CONTENTS

	Page
New Australian species of erechthitoid <i>Senecio</i> (Asteraceae) — Robert O. Belcher .....	119
Two Western Australian Hydatellaceae — D. A. Cooke .....	123
A revision of the genus <i>Platylobium</i> Sm. (Papilionaceae) — J. H. Ross .....	127
A revision of <i>Angianthus</i> Wendl., sensu lato (Compositae: Inuleae: Gnaphaliinae), 1 — P. S. Short .....	143

Editor: Helen I. Aston

Published by the National Herbarium of Victoria (MEL).  
Royal Botanic Gardens, South Yarra, Victoria 3141, Australia.  
D. M. Churchill, Director and Government Botanist.

The date of distribution of **Volume 5, number 1**, was 22 March 1982.

# NEW AUSTRALIAN SPECIES OF ERECHTHITOID SENECIO (ASTERACEAE)

by

ROBERT O. BELCHER\*

## ABSTRACT

Two new species of erechthitoid *Senecio* from Australia, *S. macrocarpus* and *S. cahillii*, are described. This validates manuscript names which have been applied to certain specimens on determinavit slips since 1967.

## DESCRIPTION

***Senecio macrocarpus*** F. Muell. ex Belcher, sp. nov.

*Erechthites hispidula* sensu Benth. Fl. Austr. 3:660 (1866), pro parte, non (A. Rich.) DC. (1838); sensu Black Fl. S. Aust. 4:610 (1929), pro majore parte.

*Caudex* brevis perennis lignosus, radice palari debili et radicibus adventitis numerosis. *Herba* caulibus erectis 20 ad 40 cm altis, saepe dense congestis; caulis arachnoideus superne glabratus, internodiis inferioribus brevibus, internodiis superioribus plus elongatis. *Folia* alterna linearia ad 10 cm longis et 2-4(-5) mm latis, acuta vel mucronata, marginibus revolutis, paginis abaxialibus arachnoideis vel hispidulis; folia inferiora numerosa, dense congesta, infima interdum denticulata; folia superiora parviora laxiora, saepe minute auriculata, apiculata. *Inflorescentia* raro simplex plerumque cymosa capitulis 6-8; pedicelli ad 5-30(-60) mm longi, ascendentes glabrati; bractae et bracteoleae ciliolatae longiacuminatae apiculatae, bracteoleae numerosae prope apices pedicellorum saepe congestae, arachnoideae vel glabratae, 4-8 mm longae. *Capitulum* magnum 15(-18) mm longum, 15-20 mm latum ubi compressum in siccitate; phyllaria 16-21(-33), glabrata vel glabra, 10-13 mm longa, circa 1 mm lata, linearia, acuminata, marginibus anguste hyalinis, apicibus saepe subroseis. *Flosculi* numero 50-100(-150) varians ad 9-12(-15) mm longi; flosculi extime filiformes (3-4(-5)-fidi pistillati vel staminodiis rudimentaris nonantheriferis, flosculi intermedi filiformes 4- vel 5-fidi staminodiis antherascentibus nonpolliniferis, flosculi medii anguste infundibulares 4- et 5-fidi staminibus 1-5 polliniferis. *Achenia* 4.5-5(-6) mm longa, rostrata, dense pilifera, pili brevissimi cinerascens.

*Rootstock* short, perennial, woody, with a weak primary root and numerous adventitious roots. *Herb* erect, 20-40 cm tall; stems often densely congested, arachnoid, glabrate above, with lower internodes short and upper internodes more elongated. *Leaves* alternate, linear, to 10 cm long and 2-4(-5) mm wide, acute or mucronate, with revolute margins, abaxial surfaces arachnoid or hispidulous; lower leaves numerous, densely congested, the lowermost sometimes denticulate; upper leaves smaller and more lax, often minutely auriculate, apiculate. *Inflorescence* rarely simple, for the most part cymose with 6-8 capitula; pedicels 5-30(-60) mm long, ascending, glabrate; bracts and bracteoles ciliate, long-acuminate, apiculate; bracteoles numerous, often crowded toward the apices of the pedicels, arachnoid or glabrate, 4-8 mm long. *Capitulum* large, 15(-18) mm long, 15-20 mm wide when compressed in drying; phyllaries 16-21(-33), glabrate or glabrous, 10-13 mm long, c. 1 mm wide, linear, acuminate, with margins narrowly hyaline, apices often subroseous. *Florets* 50 to 100 (to 150), 9-12(-15) mm long; outermost florets filiform, (3-4(-5) fid, pistillate or with rudimentary staminodes not bearing anthers; intermediate florets filiform, 4- or 5-fid, with staminodes becoming antheriferous but non-polliniferous; central florets narrowly funnel-shaped, 4- and 5-fid, with 1 to 5 polliniferous stamens. Achenes 4.5-5(-6) mm long, brown, rostrate, densely hairy; hairs very short, greyish.

The achenes of this species are most similar to those of *S. quadridentatus* Labill. but are larger and more hairy. They are very distinct from the short (2 mm long), black, thick-cylindric, densely white-haired achenes of *S. squarrosus* A. Rich.

\*Professor Emeritus of Biology, Eastern Michigan University, Ypsilanti, Michigan 48197, United States of America.

*Muelleria* 5(2): 119-122 (1983).

## HOLOTYPE:

*Victoria* — Wimmera district, Walmar Station, 18.ix.1860, *Dallachy* 23 (MEL 22987).

## SELECTED SPECIMENS EXAMINED:

*South Australia* — Near Goolwa, 23.xi.1935, *Cleland* (AD 96736163). Werrabara Forest, 1890, *Gill* (MEL 22974). In plain at foot of mountain, Lofty Ranges, *Mueller* (MEL 22970, exerted styles trifid!). Vicinity of Clare cemetery, 20.x.1961, *Simon* 1598 (ADW 24370, rather immature). Androssan, *Tate* (AD 96744130).

*Victoria* — *Backhous* (K, det. by Bentham as *Erechtites hispidula*). Werribee, 24.ix.1892, *Morrison* (PERTH, CANB 133472). Wendu Vale to Glenelg River, *Robertson* (NSW 27857). Skipton, *Whan* 22 (MEL 22982, NSW 27856). Geelong, ix.1905, *Williamson* (NSW 27855).

*Tasmania* — Woodhole, Dietz (MEL 22976). South Esk River (MEL 22977, very immature).

## DISTRIBUTION:

South-eastern South Australia, south-western Victoria, and northern Tasmania.

## DISCUSSION:

This species is the taxon referred to as unnamed in my revision of *Erechtites* and erechthitoid *Senecio* (*Ann. Mo. Bot. Gard.* 43:49 (1956)), in the discussion of the confusion by earlier authors over *S. squarrosus*. I there suggested that it might be a polyploid of *S. quadridentatus*. This remains an attractive hypothesis, although still untested cytogenetically.

In 1956 (l. c.) I decided from Black's description that his treatment of *Erechtites hispidula* applied only to *S. macrocarpus* and excluded *S. squarrosus* (as well as *S. hispidulus*). Since then a careful examination of several copiously annotated sheets of specimens from his herbarium (in AD) has shown me that these sheets include specimens of both of these large-headed Australian taxa. *S. squarrosus* appears in his description only in regard to the leaves: "sometimes . . . distantly toothed". The phrases, "near the preceding" and "achenes as in *E. quadridentata*", clearly apply only to *S. macrocarpus*, hence my present revised citation as "Black pro majore parte". Additionally, the synonymy I gave under *S. squarrosus* for *E. hispidula* (in 1956) should be changed from "non Black" to "Black pro minore parte (ex specimina in herb.)".

The holotype is apparently the specimen cited by Bentham, l.c., p. 661, as "Wimmera, Dallachy". I saw no such specimen at Kew, whereas the several labels on the holotype sheet at MEL have all been initialled by Bentham. The specific epithet recognizes a very appropriate manuscript name given to the holotype by F. von Mueller. "Walmar" is apparently a misspelling for "Wilmer", as a Wilmer Station previously existed north-east of Horsham, in the Wimmera district of western Victoria, and other collecting labels of Dallachy associate "Walmar" with locations close to Horsham (H. Aston, MEL, in litt.).

*S. macrocarpus* most closely resembles *S. squarrosus*, especially in number of phyllaries, but the latter has lanceolate-linear leaves toothed to sublobular rather than linear entire or denticulate, smaller capitula (10-12 mm long rather than 15-18 mm), florets all 5-fid rather than 3- to 5-fid, and different achenes (see above). *S. macrocarpus* is also approached in number of phyllaries by *S. pyrophilus* Zoll. & Mor. ex Zoll., of Java and Timor, but the capitula of the latter are more slender and shorter, and are intermediate in size between *S. quadridentatus* and *S. macrocarpus*, as are its achenes. *S. pyrophilus*, unlike *S. macrocarpus*, also has phyllaries pubescent on their adaxial faces. No other quadridentatoid species (including *S. gunnii* (Hook. f.) Belcher and *S. runcinifolius* Willis), exhibits mucronate leaf apices.

***Senecio cahillii* Belcher, sp. nov.**

*Caudex* perennis; caulis suffruticosus erectus 60-120 cm altus, glabrescens, ramis grandis infra inflorescentium paucis vel nullis, saepe ramulis brevibus foliosis congestis e foliorum summorum axillis ortae. *Folia* sessilia, auriculis nullis vel simplicis vel bidentatis, supra auriculas subpetiolata cuneata glabrescentia, laminae foliorum costis subtus manifeste tumidis; folia basilia 10-13 cm longa, 1.5-2.5 cm lata, oblanceolata, grosse dentata, vulgo marcida vel abscissa ante anthesin; folia media 6-10 cm longa, 0.4-0.8(-1.2) cm lata, anguste oblanceolata vel linearia, irreguliter dentata vel aequaliter denticulata; folia superne similaria sed reducta. *Inflorescentia* corymbosa

erecta glabra vel puberula, capitulis 10-25, pedicelli ad 5-10 mm longi, bracteae et bracteolae late subulatae apicibus fuscatis. *Capitula* 5-6 mm longa, phyllaria involucri 8 or 9(-11), 4.5-5 mm longa, ca. 0.5 mm lata, binervia, valde carinata in alabastro, applanata per anthesin, demum rigescentia late extendentia post fructificantem, apicibus fuscatis ciliolatis. *Flosculi* numero 8-16(-21); flosculus pistillatus 4.5-5 mm longus, basi 0.2-0.25 mm diametro, tubo filiformi, apice tenuiter infundibuliformi; flosculi pistillati extimi 3-fidi, intermedii 4-fidi; flosculi medii perfecti 5-5.5 mm longi infundibuliformi 4- vel 5-fidi, ramis stylosum 0.5 mm longis. *Achenia* 2.5 mm longa subcylindracea non rostrata ferruginea, porcis decem latis humilibus planis, trichomatibus 0.1 mm longis subappressis in sulcis perangustis; pappus pilis, tenuibus niveis, flosculos aequans, demum phyllaria excedens ad 2 mm.

Similis ad *S. biserratum* sed foliis angustioribus minus grosse dentatis, flosculis extimis 3-fidis vice 5-fidorum, et ramis stylosum magnitudine dimidiatis. Ab *S. minimo* differt in achenio longiore trichomatibus in sulcis non insidens porcio, in folio angustiore et magis irreguliter dentato, et in phyllario breviori et grosso.

*Rootstock* perennial. *Stems* woody below, erect, to 60-120 cm tall, glabrescent, with few or no major branches below the inflorescence, often with short branchlets congested with leaves and borne in the axils of the uppermost leaves. *Leaves* sessile, with auricles lacking or simple or bidentate, above the auricles subpetiolate and cuneate, glabrescent, the blades of the leaves with midribs obviously swollen on the undersides; lower leaves 10-13 cm long, 1.5-2.5 cm wide, oblanceolate, coarsely dentate, generally withering or abscissing prior to anthesis; middle leaves 6-10 cm long, 0.4-0.8(-1.2) cm wide, narrow-oblanceolate or linear, irregularly dentate or equally denticulate; upper leaves similar but reduced. *Inflorescence* corymbose, erect, glabrous or puberulent, with 10-25 capitula per corymb on pedicels 5-10 mm long, bracts and bracteoles broadly subulate with apices darkened. *Capitula* 5-6 mm long, phyllaries of the involucre 8 or 9(-11), 4.5-5 mm long, 0.5 mm wide, two-nerved, strongly keeled in bud, flattening at anthesis, eventually becoming rigid and widely extended after fruiting, the apices darkened and ciliolate. *Florets* 8-16(-21) in number; the pistillate floret 4.5-5 mm long, 0.2-0.25 mm in diameter at the base, with the tube filiform, its apex slenderly infundibuliform; outermost pistillate florets 3-fid, intermediate pistillate florets 4-fid, the central florets perfect, 5-5.5 mm long, infundibuliform, 4- or 5-fid, branches of the styles 0.5 mm long. *Achenes* 2.5 mm long, subcylindrical, non-rostrate, reddish-brown, with ten broad low flat ridges, with trichomes 0.1 mm long, subappressed in the very narrow grooves; pappus with hairs slender, snowy white, equalling the florets, eventually exceeding the phyllaries by 2 mm.

Similar to *S. biserratus* Belcher but with leaves more narrow and less coarsely toothed, the outermost florets 3-fid instead of 5-fid, and the branches of the styles only half as long. Differs from *S. minimus* Poir. in the slightly longer achene with trichomes in the grooves instead of on the ridges, in the narrower and more irregularly toothed leaf, and in the shorter and coarser phyllary.

#### TYPE COLLECTION:

*Victoria* — East Gippsland, Buchan River near junction of Reedy River, 6.ii.1973, A. C. Beaglehole 41406 (Holotype: MEL 501429. Isotype: MEL 501428).

#### SELECTED SPECIMENS EXAMINED:

*Western Australia* — Wellington District, State Forest #15, approx. 16 km SE. of Harvey, in jarrah forest dieback area partially burned in 1965, 25.viii.1967, Cahill 22 (PERTH). Ibidem, 13.x.1967, R. & R. Belcher 245, 250 (EMC). Pasture on Roelands — Collie road about 13 km east of South Western Highway, 30.ix.1967, R. & R. Belcher 183 (EMC).

*Queensland* — Bunya Mountains, between Noobler's Lookout and Burton's Well, 29.xi.1967, Belcher 810-A (EMC). Gympie, Kenny (BR1 073659).

*New South Wales* — Warragamba Dam area, half a mile S of Nattai Junction, 23.ii.1967, Briggs 1118 (NSW 95691). Central Tablelands, Mt. Victoria, 15.i.1892, Fletcher (NSW 27821). Maryland, Wylie Creek road turn-off, 10.i.1956, M. Gray (CANB 97679). Central Coast, Hill Top, i.1903, Maiden (F; NSW 27819). New England, Goff's Gully, iii., C. Stuart (MEL 22750).

*Victoria* — East Gippsland, Timbarra River, Old Ensay Track, 14.xii.1970, A. C. Beaglehole 35491 (EMC; MEL 540861).

#### DISTRIBUTION:

Eastern slopes of the Great Dividing Range from south-eastern Queensland abundantly through New South Wales to East Gippsland in Victoria; recently locally adventive in south-western Western Australia.

## DISCUSSION:

The specific epithet recognises Mr. C. O. Cahill, Weed Control Officer at Bunbury, Western Australia, in 1967. He was the first to refer material of this taxon from that State for identification and also kindly directed me to occurrences in his area. The species had become locally common as an aggressive invader in paddocks. It also occurred in jarrah forest on dieback areas produced by the root parasite, *Phytophthora cinnamoni*. Ecological data on the labels of the many New South Wales collections held at the National Herbarium of that State strongly suggest a preference for moist stream sides and disturbed areas.

*S. cahillii* is best recognised in the field by its very erect habit, lack of lower branches above the basal stool (from which it may sprout very prolifically to form large clumps) and especially by the densely crowded branchlets in the axils of the upper leaves, the leaves of these branchlets being short and linear or nearly so. The isotype (MEL 501428) is unusual in that the right-hand specimen has 3 large flowering branches from fairly low on the stem. This, however, is due to the main stem having been broken off earlier, just above the origin of the branches.

Manuscript received 5 November 1981.



## TWO WESTERN AUSTRALIAN HYDATELLACEAE

by

D. A. COOKE\*

### ABSTRACT

*Trithuria bibracteata* and *Hydatella dioica*, two species from Western Australia previously lacking valid names, are described.

### INTRODUCTION

In 1903, material of two species of Hydatellaceae collected by W. V. Fitzgerald in seasonal swamps at Midland Junction near Perth was sent to the Royal Botanic Gardens, Kew, for identification. The names *Trithuria bibracteata* and *T. macranthera* were assigned to these species by O. Stapf but never published by him. They have passed into literature as nomina nuda. As an account of the family is being prepared for the *Flora of Australia*, this opportunity is taken to publish valid names for the two species.

### DESCRIPTIONS

***Trithuria bibracteata*** Stapf ex D. A. Cooke, sp. nov.

TAXONOMIC SYNONYM: *T. bibracteata* Stapf ex W. V. Fitzgerald in *J. W. Aust. Nat. Hist. Soc.* 2(1):36 (1904) nomen nudum; Blackall & Grieve 1:58 (1954), sans descr. Lat.

Herba annua perpusilla rubescens caespituli foliosi ad 1 cm diametro formans. *Caulis* brevissimus pilibus numerosis usque ad 2 mm longis. *Folio* basalia linearia 5-6 mm longa usque ad 0.4 mm lata glabra, basibus subhyalinis parce dilatis, nervis mediis inconspicuis, apicibus acutis. *Scapi* absentes. *Capitula* numerosa sessilia unumquidque bracteis 2 involucreto, flosculis masculis 1-2, flosculis foeminis 6-10. *Bracteae* lanceolatae 2-3 mm longae subhyalinae, basibus dilatis ad c. 1.2 mm latis vaginantibus. *Stamen* filamento usque ad 2.5 mm longo, anthero oblong-elliptico 0.4-0.6 mm longo c. 0.15 mm lato. *Ovarium* breviter stipitatum, ovoideum c. 0.3 mm longum, pilis stigmaticis 2-5 c. 2 mm longis terminalibus caducis. *Fructus* in stipite fragili usque ad 0.4 mm longo, ovoid-trigonus c. 0.5 mm longus, superficiebus 3 delicatis pallidis inter costas vasculares 3 aequae dispositas, semen liberandum fatiscens. *Semen* ovoideum 0.4-0.5 mm longum; testa brunnea retifoveata. (Descriptio typi.)

Very small annual herb, becoming red-tinted, forming leafy tufts to 1 cm in diameter. *Stem* very short, with numerous hairs up to 2 mm long. *Leaves* basal, linear, 5-6 mm long and up to 0.4 mm wide, glabrous with slightly dilated subhyaline bases, faint midveins and acute apices. *Scapes* absent. *Heads* numerous, sessile, each with an involucre of 2 bracts, 1-2 male florets and 6-10 female florets. *Bracts* lanceolate, 2-3 mm long, subhyaline, with sheathing bases dilated to c. 1.2 mm wide. *Stamen* with filament up to 2.5 mm long, anther oblong-elliptic 0.4-0.6 mm long and c. 0.15 mm wide. *Ovary* shortly stipitate, ovoid, c. 0.3 mm long, with 2-5 caducous terminal stigmatic hairs c. 2 mm long. *Fruit* on a fragile pedicel up to 0.4 mm long, ovoid-trigonal, c. 0.5 mm long, with 3 pale delicate panels between 3 equally spaced ribs containing vascular bundles, disintegrating to release the seed. *Seed* ovoid, 0.4-0.6 mm long; testa brown, reticulate-foveate.

#### TYPE COLLECTION:

Boyanup, 15.x.1947, R. D. Royce 2265 (Holo: PERTH)

#### SELECTED SPECIMENS EXAMINED (total 8):

Perup River, E. of Manjimup, x.1948, H. Butler s.n. (PERTH); Midland Junction, ix.1901, W. V. Fitzgerald s.n. (PERTH); Midland Junction, x.1903, W. V. Fitzgerald s.n. (NSW 148478, PERTH).

---

\*9/51 Marne Street, South Yarra, Victoria 3141.

*Muelleria* 5(2): 123-125 (1983).

## DISTRIBUTION:

Scattered in seasonally wet habitats in the Darling district (Beard, 1980) of Western Australia, where widespread in the Drummond subdistrict and also recorded from the Menzies subdistrict.

## NOTES:

*Trithuria bibracteata* is closely related to *T. lanterna* D. A. Cooke (1981), which it resembles in habit, foliage and inflorescence. The fruit is a morphological link between the hyaline, indehiscent fruit of *T. lanterna* and the dehiscent capsule of *T. submersa* Hook. f. In *T. bibracteata* the pericarp is thin and fragile, generally crumbling irregularly as the whole plant dries out, but sometimes splitting along the vascular ribs as in *T. submersa*. The thick sculptured testa confirms that the seed, rather than the fruit, is the disseminule.

The hairs at the base of the plant each consist of a single row of up to 6 hollow, elongated, thin-walled cells. Similar hairs have been observed on the stem among the leaf-bases in all Australian species of Hydatellaceae, but are greatly reduced or absent in many specimens. Being characteristic of the family, they are thus of little diagnostic value.

**Hydatella dioica** D. A. Cooke, sp. nov.

TAXONOMIC SYNONYMS: *Trithuria micranthera* (misspelling of *macranthera*) Stapf ex W. V. Fitzgerald in *J. W. Aust. Nat. Hist. Soc.* 2(1):36 (1904) nomen nudum; Blackall & Grieve 1:58 (1954), sans descr. Lat.

*T. macranthera* Bortenschlager et al. in *Bot. Not.* 119:161 (1966) nomen nudum.

Herba annua dioica rubescens usque ad 4 cm alta. *Caulis* brevissimus. *Folia* basalia linearia usque ad 25 mm longa et 1 mm lata, glabra, basibus hyalinis parce dilatis, nervis mediis prominentibus, apicibus acutis. *Capitula* mascula plura; unumquidque bracteis 2 involucreto, super scapo erecto nonramoso tereti nudo usque ad 3 cm alto terminans. *Bractee* oppositae erectae lanceolatae 7-8 mm longae arcte vaginantes glabrae subhyalinae nervis mediis prominentibus. *Stamina* 8-10 alium ex alio exserta, filamentis usque ad 10 mm longis flexuosis persistentibus, antheris linearis c. 3 mm longis et 0.2 mm latis caducis. *Capitula* foemina non vidi. (Descriptio typi.)

Annual dioecious herb to 4 cm tall. *Stem* very short. *Leaves* basal, linear, to 25 mm long and 1 mm wide, glabrous, with slightly dilated subhyaline bases, prominent midveins, and acute apices. *Male heads* several; each with an involucre of 2 bracts, terminating an erect unbranched naked terete scape up to 3 cm tall. *Bracts* opposite, erect, lanceolate, 7-8 mm long, closely sheathing, glabrous, subhyaline with prominent midveins. *Stamens* 8-10, exserted one after another, with flexuose persistent filaments up to 10 mm long and caducous linear anthers c. 3 mm long and 0.2 mm wide. *Female heads* not seen.

## TYPE COLLECTION:

Midland Junction, 16.xi.1898, A. Morrison s.n. (Holo: PERTH).

## ALSO EXAMINED (total 5):

Midland Junction, ix.1901, W. V. Fitzgerald s.n. (NSW 148484, PERTH); Midland Junction, x.1903, W. V. Fitzgerald s.n. (NSW 148483).

## DISTRIBUTION:

Known only from seasonal swamps at Midland Junction, Darling district, Western Australia, where possibly now extinct due to development.

## NOTES:

This is the only dioecious species known in the Hydatellaceae and is therefore placed with the other species having homogamous inflorescences in the genus *Hydatella*, rather than in *Trithuria* with heterogamous inflorescences. The specimens examined have leaves and male heads similar to those of *Hydatella australis* Diels and differ primarily in the greater size and numbers of organs.

The pollen grains of this species were described and illustrated by Bortenschlager et al. (1966).

## ACKNOWLEDGEMENTS

I would like to thank the Directors of PERTH and NSW herbaria for the loan of collections and also the staff of the National Herbarium of Victoria (MEL), where this paper was prepared.

This work was carried out while the author was acting as a consultant to the Bureau of Flora and Fauna, Department of Home Affairs and Environment.

## REFERENCES

- Beard, J. S. (1980). A new phytogeographic map of Western Australia. *W. Austral. Herb. Res. Notes* 3:37-58.
- Blackall, W. E. & Grieve, B. J. (1954). 'How to Know Western Australian Wildflowers'. Part 1. (University of Western Australia Press: Perth).
- Bortenschlager, S., Erdtman, G. & Praglowski, J. (1966). Pollenmorphologische Notizen über einige Blütenpflanzen incertae sedis. *Bot. Not.* 119:160-168.
- Cooke, D. A. (1981). New Species of *Schoenus* (Cyperaceae) and *Trithuria* (Hydatellaceae). *Muelleria* 4:299-303.
- Fitzgerald, W. V. (1904). Additions to the West Australian Flora. *J. W. Aust. Nat. Hist. Soc.* 2(1):3-36.

Manuscript received 13 January 1982.



# A REVISION OF THE GENUS *PLATYLOBIUM* Sm. (PAPILIONACEAE)

by

J. H. Ross\*

## ABSTRACT

The endemic Australian genus *Platylobium* Sm. is revised. Four species are recognised and *P. gracile* Dum.-Cours. and *P. rotundifolium* Colla are rejected as names of uncertain application. Formal infraspecific taxa in *P. formosum* are discussed but not upheld. Descriptions, a key to the identification of species, illustrations and distribution maps are provided, together with notes on ecology and relationships.

## INTRODUCTION

*Platylobium*, a small genus of four species described by J. E. Smith, Spec. Bot. New. Holl. 1:17, t.6 (1793), is confined to eastern Australia occurring from the vicinity of Wide Bay in south-eastern Queensland southwards to Tasmania and westward to Kangaroo Island in South Australia. The present centre of distribution of the genus is in Victoria where all species occur. The generic name is taken from the Greek and alludes to the broad pods found in species of the genus.



Fig. 1. The distribution of the genus *Platylobium*.

*Platylobium* is a member of the tribe Bossiaseae (Benth.) Hutch. and belongs to the *Bossiaea* group of genera which are characterised by having uniform dorsifixed anthers with a broad connective, seeds with generally hooded cap-like arils and slender curved radicles exerted from the cotyledons, and plants with a tendency to accumulate canavanine (Polhill, 1976, 1981). The *Bossiaea* group comprises the genera *Bossiaea* Vent., *Platylobium*, *Goodia* Salisb., *Aenictophyton* A. Lee, *Ptychosema* Benth. and *Muelleranthus* Hutch.. *Platylobium* and *Bossiaea* are readily distinguished from the other genera in having the flowers subtended by a series of papery brown scales.

*Platylobium* was described prior to *Bossiaea* and a number of taxa initially described as species of *Platylobium* are referable to *Bossiaea*. This is not surprising as *Platylobium* is unquestionably very closely allied to *Bossiaea* and the view has been expressed (Polhill, 1976) that *Platylobium* is scarcely distinct from *Bossiaea* at generic level.

*Platylobium* differs from *Bossiaea* in the development of a distinct wing beyond the upper sutural nerve of the pod and in the valves being very thin and revolute on dehiscence, in the extreme enlargement of the two upper calyx-lobes, and in having a diploid chromosome number of 16 as opposed to the 18 found in *Bossiaea*. In addition, Ferguson & Skvarla (1981) found that the pollen of *Platylobium* has a well-defined endoaperture whereas that of *Bossiaea* has a poorly defined interruption in the endexine.

---

\*National Herbarium of Victoria, Birdwood Avenue, South Yarra, Victoria 3141.

*Muelleria* 5(2): 127-141 (1983).

The extreme enlargement of the two upper calyx-lobes in *Platylobium* does not distinguish the two genera absolutely as the two upper calyx-lobes in some species of *Bossiaea* are greatly enlarged as in *Platylobium*, and the pod-valves in some species of *Bossiaea* are narrowly winged beyond the upper sutural nerve and occasionally are slightly revolute on dehiscence.

The four species of *Platylobium* have a distinctive "look" and appear to represent a fairly natural group. Provided that the close relationship between the genus and *Bossiaea* is acknowledged, the differences between the two provide a workable distinction and no advantage is seen in including the few species of *Platylobium* in the much larger and rather heterogeneous *Bossiaea*. As *Platylobium* was described first, its amalgamation with *Bossiaea* would necessitate the conservation of the latter name.

In habit, all species of *Platylobium* are shrubs or subshrubs with woody rootstocks. The leaves in *P. alternifolium* are alternate whereas in the other species they are opposite except for the occasional occurrence in *P. formosum* of a variant in which some of the leaves are borne alternately. Leaf size and shape in all species except *P. alternifolium* varies considerably. The variation in leaf shape within *P. obtusangulum* and *P. triangulare* is such that unfortunately the character cannot be employed to differentiate the two species. The range of variation in leaf size and shape in *P. formosum* is so great that the extremes look quite different but when the range of variation is inspected it is clear that the extremes are linked by numerous and varied intermediates. Floral characters provide useful means of differentiating the species but the pods and seeds are relatively uniform within the genus.

#### TAXONOMY

**Platylobium** Sm., Spec. Bot. New Holl. 1:17, t.6 (1793); Trans. Linn. Soc. Lond. 2:350 (1794); Trans. Linn. Soc. Lond. 9:302 (1808); Willd., Sp. Pl. 3:921 (1802); DC., Prodr. 2:116 (1825); G. Don, Gen. Syst. 2:127 (1832); Benth., Fl. Austr. 2:152 (1864); Benth. in Benth. & Hook.f., Gen. Pl. 1:473 (1865); Taub. in Engl., Pflanzenfam. 3, 3:216 (1893); Hutch., Gen. Fl. Pl. 1:348 (1964); Polhill, Bot. Syst. 1:311 (1976); Polhill in Advances in Legume Systematics 1:395 (1981). TYPE: *P. formosum* Sm.

*Shrubs or Subshrubs*, sometimes prostrate or occasionally semi-scandent, with one to several slender, terete, unarmed stems arising from a woody rootstock. *Stipules* ovate to narrow-ovate, striate, persistent; stipellae absent. *Leaves* opposite or, less frequently, alternate, simple or unifoliate, sessile or petiolate, narrow-ovate to broad-ovate-cordate, triangular-ovate, hastate, trilobate, cordate-hastate or occasionally almost orbicular, the apex and usually the angles pungent-pointed, reticulately veined. *Flowers* 1-several from the axils, almost sessile or on long slender pedicels, orange-yellow and red or purplish-brown, subtended by a series of distichous brown papery scales, the bract indistinguishable from the scales; bracteoles paired, at or near the apex of the pedicel, similar to the scales but often larger. *Calyx* sparingly to densely pubescent throughout except in *P. alternifolium*, the two upper lobes greatly enlarged, broadly rounded, usually united for less than half their length, the three lower lobes narrow and acute, persisting in fruit. *Standard* orbicular or reniform, with a well developed claw; *wing* petals rounded or obtuse apically, much shorter than the standard; *keel* petals almost as long as the wings. *Stamen*-filaments united in a sheath split open on one side; anthers uniform, dorsifixed, with a broad connective. *Ovary* sessile or stipitate, style slender, curved, with a small terminal stigma. *Pods* sessile or stipitate oblong, flat, with a conspicuous thin wing 2-5 mm wide beyond the upper sutural nerve, transversely striate-nerved, several-seeded; valves thin, elastically revolute, revealing a glossy inner surface. *Seeds* ovate-ellipsoid or ellipsoid, plump, with a small hilum on a long side covered by a hooded cap-like aril; radicle, slender, curved.

#### KEY TO SPECIES

1. Leaves alternate; calyx glabrous externally except for a conspicuous fringe of hairs on the margins of the lobes ..... 1. *P. alternifolium*

1. Leaves opposite, very infrequently some leaves alternate (*P. formosum*) but then the calyx clothed externally with spreading or appressed hairs throughout
2. Flowers and pods subsessile, the pedicel concealed by a series of conspicuous brown papery bracts and scales ..... 3. *P. obtusangulum*
2. Flowers and pods distinctly pedicellate, the pedicels exceeding and exerted from the bracts and scales
3. Leaves broad-triangular or cordate-hastate, the lateral angles and apex usually pungent ..... 2. *P. triangulare*
3. Leaves narrow-ovate to broad-ovate-cordate, the apex pungent but the lateral angles usually rounded or obtuse and not pungent ..... 4. *P. formosum*

1. ***Platylobium alternifolium*** F. Muell., S. Sci. Rec. 3:99 (1883); J. H. Willis, Handb. Pl. Vict. 2:277 (1973). SYNTYPES: See under notes. LECTOTYPE, here selected: Victoria, Mt. William, 1883, *D. Sullivan* (MEL 569729!).

Small *subshrub* with one to several prostrate spreading or trailing stems, the young stems sparingly to densely clothed with spreading hairs. *Stipules* ovate or narrow-ovate, up to 3.5 × 2 mm. *Leaves* alternate, unifoliolate: petiole 0.3-2 cm long, sparingly to densely clothed with spreading hairs; lamina cordate to ovate or triangular-ovate with an acute apex or almost orbicular and rounded apically, (0.6)1-2.6 × 0.6-2.5 cm, upper and lower surfaces sparingly to densely clothed with spreading hairs when young but becoming glabrous and minutely scabrid with age, venation fairly prominent. *Flowers* solitary, axillary, on glabrous to sparingly pubescent pedicels 1.5-2 cm long, the pedicels with a series of distichous scales and bracts along their length which are glabrous except for marginal cilia, the paired bracteoles below the calyx 5.5-7.5 × 2.5-3.5 mm, glabrous apart from marginal cilia. *Calyx* pinkish-red, glabrous outside except for a conspicuous fringe of hairs on the margins of the lobes: 2 upper lobes 7-9.5 mm long (including the basal tube of up to 3.5 mm), 4-5 mm wide, the 3 lower lobes up to 3.5 × 1.2 mm, narrow-triangular. *Corolla*: *standard* oblate, 13.5-15.5 mm long including a claw up to 3.5 mm long, 15-18 mm wide, deeply emarginate apically, brick-red outside, yellow inside with a deep yellow basal horse-shoe shaped throat surrounded by a reddish-purplish zone; *wings* up to 10.5 mm long including a claw up to 2 mm long, up to 3.5 mm wide, auricled, yellow except for a central dark red or purplish band; *keel* petals up to 9.5 mm long including a claw up to 1.5 mm long, 4-4.6 mm wide, auricled, dark purplish in upper half. *Stamens* up to 9.5 mm long. *Ovary* shortly stipitate, up to 5 mm long, margins with long white hairs but otherwise glabrous; style with long white basal hairs, glabrous above. *Pods* oblong, 1.3-2 × 0.7-2 cm, with a thin conspicuous wing up to 2 mm wide beyond the upper sutural nerve, (1)2-4-seeded, with scattered hairs on the margins but otherwise glabrous. *Seed* ellipsoid, 3.6 × 2.5 mm (only one seen) (Fig. 2).

*P. alternifolium* is confined to the Grampians and Bolangum Ranges in western Victoria where it occurs on moist east-facing slopes in closed *Eucalyptus* woodland (Fig. 3).

#### REPRESENTATIVE SPECIMENS:

Victoria — Grampians, near crest of Mt. Difficult Range, E. of Wartook Reservoir, 10.x.1962, *T. B. Muir* 2607 (MEL 99432). Grampians, Mt. Difficult Range (East), 2.vi.1969, *A. C. Beaglehole* 30754 (MEL 99431). Grampians, Mt. Difficult Range road, 12 km N. of its junction with Halls Gap — Zumstein's road, 5.x.1980, *M. G. Corrick* 6801 & *P. S. Short* (MEL 576033).

#### NOTES:

Mueller based his description of *P. alternifolium* on the following specimens: "On Mount Disappointment, F.v.M.; on Mount Ben Nevis, Ch. Green; on Mount William, Sullivan and Miller." Four syntypes are housed in the National Herbarium of Victoria (MEL), namely, Mt. Disappointment, Mueller (MEL 569726), Mt. Ben Nevis, Ch. Green (MEL 569727) and Mt. William, Sullivan (MEL 569728, MEL 569729). I have not succeeded in locating the syntype from Mt. William collected by Miller although the possibility exists that the flowering specimen received at Kew Herbarium in Oct. 1884 from MEL bearing the locality "Grampians", but without any indication of the collector, is the Miller syntype.

The two syntypes collected by Sullivan have a different facies from that of the specimens collected by Mueller and by Green which suggests that Mueller inadvertently

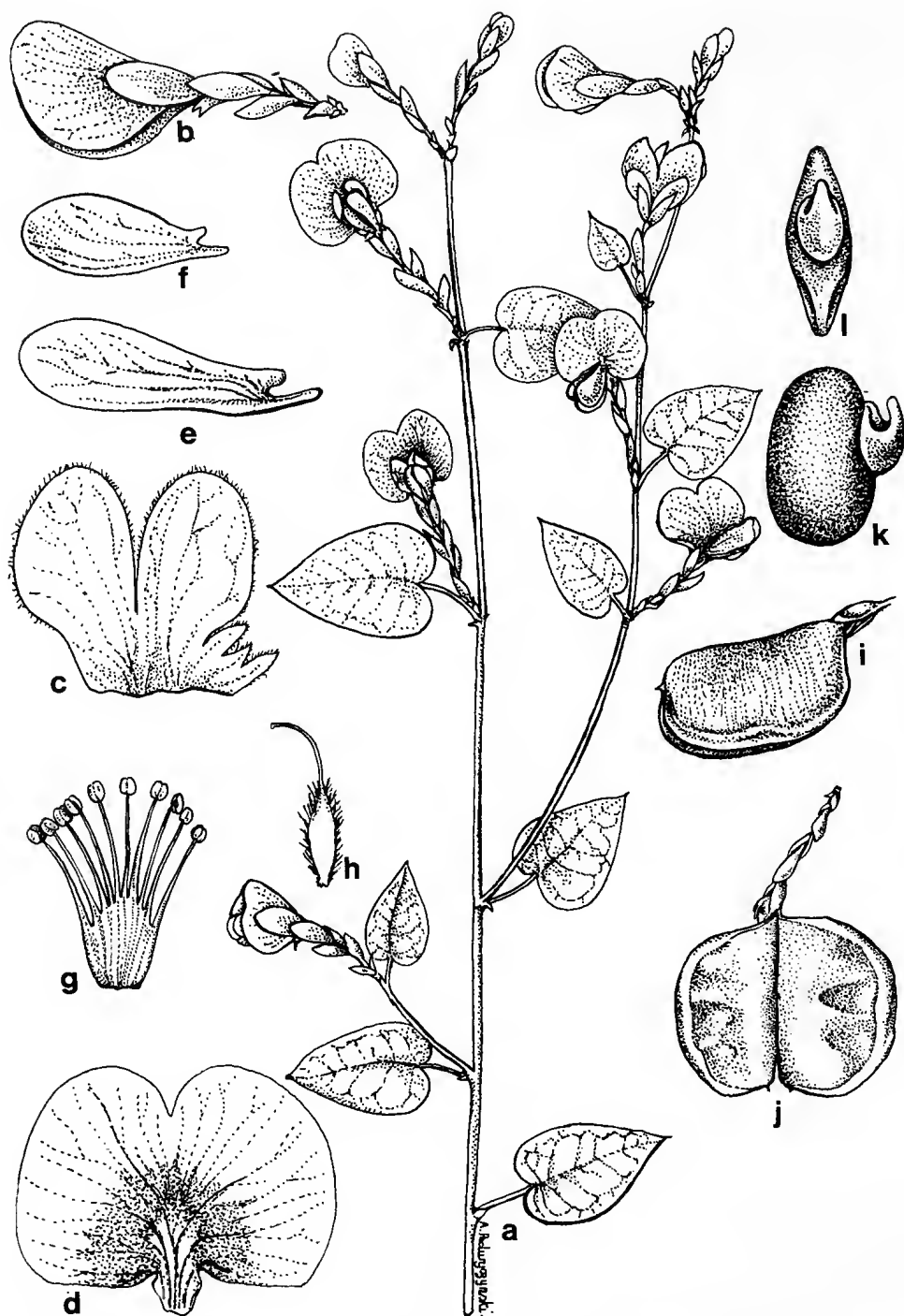


Fig. 2. *Platylobium alternifolium*. a — flowering twig, x 1; b — flower, with a series of distichous scales and bracts along the length of the pedicel, x 2; c — calyx opened out (upper lobes on left), x 4; d — standard, x 3; e — wing petal, x 3; f — keel petal, x 3; g — staminal tube opened out, x 3; h — gynoecium, x 3; i — pod, side view, x 1½; j — pod, after dehiscence, x 1½; k — seed, side view, x 6; l — seed, hilar view, x 6. a-h from M. G. Corrick 6801 & P. S. Short (MEL 576033); i-l from A. C. Beauglehole 30754 (MEL 99431).



included discordant elements in the protologue of *P. alternifolium*. The Mueller and Green syntypes are rather poor sterile specimens and were no doubt included by Mueller as they have alternate leaves, an occurrence not then recorded in any other *Platylobium* species and to which much significance was attached. One of the Sullivan specimens (MEL 569728) is sterile but the other (MEL 569729) is fertile and shows the series of scales and bracts along the length of the pedicel, the calyx which is glabrous except for a conspicuous fringe of marginal hairs, and a young fruit with long white marginal hairs but otherwise glabrous. The specimen from the Grampians in K referred to above matches the two Sullivan collections.

*P. formosum* typically has opposite leaves but a variant of this polymorphic species in which the leaves are sometimes alternate occurs sporadically in Victoria from Blackwood in the west to Gippsland in the east. When fertile, such specimens may be distinguished from *P. alternifolium* without difficulty as the calyces and young pods are densely pubescent throughout and the pedicels are exserted from the basal bracts and scales. Sterile specimens are more difficult to place with certainty but I am reasonably satisfied that the specimens collected by Mueller and Green are in fact referable to *P. formosum* and not to *P. alternifolium*. In view of this, I now select Sullivan (MEL 569729) from Mt. William as the lectotype of *P. alternifolium*.

As a result of the exclusion of the variant of *P. formosum* with petiolate alternate leaves from the circumscription of *P. alternifolium*, *P. alternifolium* now has a much more restricted distribution in Victoria being confined apparently to the Grampians and Bolangum Ranges. The only specimen (Audus s.n., MEL 569725) from the Bolangum Ranges is sterile and, because of the uncertainty attached to sterile specimens in this genus, fertile material from this locality is required to confirm the occurrence there of *P. alternifolium*. Audas (1921) made special mention of the unexpected occurrence of *P. alternifolium* in the Bolangum Ranges and there is no reason to suppose that his specimen was not collected there. Audas gave no indication of the route he took after leaving the Kingston mine so it is not possible to re-trace his steps. Unfortunately a recent attempt by my colleague Mrs M. G. Corrick to locate *P. alternifolium* in the Bolangum Ranges was unsuccessful.

*P. alternifolium* is the only species in the genus in which the calyces are not clothed with appressed or spreading hairs throughout. The consistently alternate leaves distinguish *P. alternifolium* from the other species except for the occasional variant of *P. formosum*.

**2. *Platylobium triangulare*** R.Br. in Ait.f., Hort. Kew. ed. 2, 4:266 (1812); DC., Prodr. 2:116 (1825) pro parte excl. ref. Sims in Curtis's Bot. Mag. t.1508; Benth., Fl. Austr. 2:152 (1864); J. M. Black, Fl. S. Austr. ed. 2:445 (1948); W. Curtis, Stud. Fl. Tasm. 1:141 (1956); J. H. Willis, Handb. Pl. Vict. 2:278 (1973); non Sims in Curtis's Bot. Mag. t.1508 (1812); non Hook.f., Fl. Tasm. 1:96 (1856). SYNTYPE: See under notes. LECTOTYPE, here selected: Tasmania, King's Island, 23.iv.1802, *R. Brown* (BM; MEL, photo.).

*P. murrayanum* Hook. in Curtis's Bot. Mat. t.3259 (1833); Hook.f., Fl. Tasm. 1:96 (1856). TYPE: Curtis's Bot. Mag. t.3259 (iconotype).

Small *shrub* with prostrate or ascending, slender, glabrous to densely villous stems up to 50 cm long. *Stipules* ovate, up to 2×1 mm. *Leaves* opposite, simple, broadly triangular or cordate-hastate, the lateral angles and apex usually pungent or the lateral angles of some lower leaves sometimes rounded, (1)1.3-3.2×(0.6)1-2.6 cm, glabrous above and minutely scabrid or with few scattered hairs especially on the midrib, lower surface usually with scattered hairs especially on midrib, larger veins and margins but sometimes glabrescent. *Flowers* usually solitary but 1-3 per axil, on villous pedicels 0.6-1.8 cm long, the pedicels exserted from the basal bracts and scales which are glabrous except for marginal cilia, the paired bracteoles below the calyx 2-3.7×1.5-2 mm, glabrous except for the margins, usually reflexed. *Calyx* densely clothed with long appressed or slightly spreading hairs: 2 upper lobes 9.5-12.5 mm long (including the basal tube of 4.5-6 mm), 5-6.5 mm wide, the 3 lower lobes 4.5-6.5×1.2-1.5 mm, the centre lobe longest and narrowest. *Corolla*: *standard* oblate, 12-16 mm long including a claw up to 3 mm long, 15-18.5 mm wide, deeply emarginate apically, dark purplish-brown or

pinkish-red outside, orange-yellow inside with a yellow basal horse-shoe shaped throat surrounded by a reddish-purple zone; *wings* 10-13 mm long including a claw up to 3 mm long, 4.5-5.5 mm wide, dark reddish basally, orange-yellow apically, auricled; *keel* petals 9.7-12.5 mm long including a claw up to 3 mm long, 4.5-5 mm wide, dark purplish or reddish apically, white basally. *Stamens* up to 11 mm long. *Ovary* 5.5-9 mm long including a stipe 0.5-1.75 mm long, margins with long white hairs but otherwise glabrous; style with long basal hairs, glabrous above. *Pods* oblong, 2.2-3.3 × 1.2-1.8 cm, on a stipe 2-4.5 mm long, with a thin conspicuous wing up to 4 mm wide beyond the upper sutural nerve, 3-5-seeded, with scattered hairs on the margins but otherwise glabrous. *Seeds* ellipsoid, 2.5-3.6 × 1.6-2.3 mm (Fig. 4).

*P. triangulare* occurs in southern Victoria and in Tasmania where it is found most frequently in open woodland and heathland. There is a curious distributional discontinuity in Victoria from Wilson's Promontory in the east to Orford in the west from where the species extends its range westward as far as the Glenelg River. The area between Wilson's Promontory and Orford is reasonably well collected and the discontinuity appears to be genuine rather than the result of inadequate collecting. According to the label accompanying MEL 572090, the specimen was collected by L. Henry from the Upper Darling near the Queensland border in 1884. However, as this locality is so far removed from the nearest known populations of *P. triangulare*, it seems probable that the label does not belong with the specimen (Fig. 3).

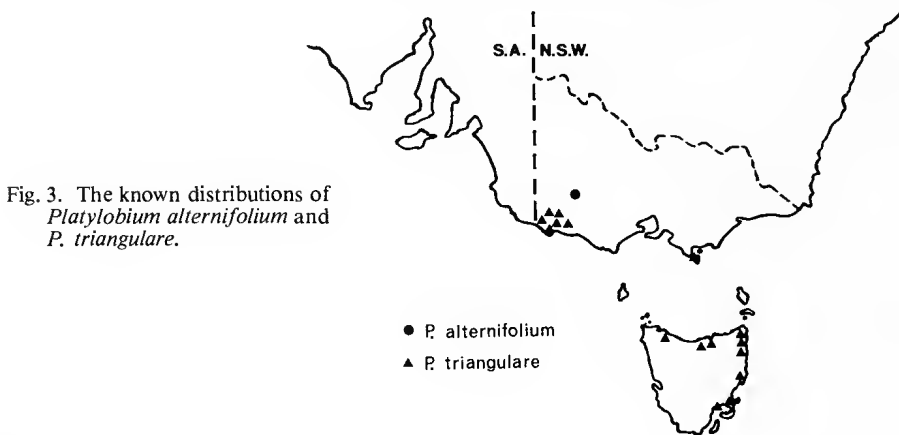


Fig. 3. The known distributions of *Platylobium alternifolium* and *P. triangulare*.

#### REPRESENTATIVE SPECIMENS:

*Victoria* — Portland Distr., 4.8 km S.E. of Gorae West along main Portland-Nelson Rd., 22.x.1960, *H. I. Aston* 726 (MEL 570858). 5 km E. of Casterton-Dartmoor main road along Moonlight Rd., 2.xi.1980, *P. S. Short* 1222 (MEL 1522094). Wilson's Promontory, Waterloo Bay, 6.xi.1980, *M. G. Corrick* 7078 (MEL 576042).

*Tasmania* — St. Helen's, x.1945, *W. M. Curtis* (HO 115500). 3.2 km N.W. of Coles Bay, 14.x.1967, *J. H. Hemsley* 6297 (HO 11557, MEL 570862). Track above Botanical Creek, Freycinet Peninsula, 21.1.1980, *A. M. Buchanan* 152 (HO 36184).

#### NOTES:

It is not clear whether R. Brown based his description of *P. triangulare* on a plant raised at Kew Gardens from seed introduced by himself in 1805 from Tasmania, whether the description was based on his specimens collected in Australia, or whether it was based on both. I have not succeeded in locating a specimen in BM from a plant cultivated at Kew. In BM there are, however, three R. Brown collections from Australia, namely, an unnumbered specimen collected on King's Island, Bass Strait, on 23 Apr. 1802, an unnumbered specimen collected at Arthur's Seat, Port Phillip, Victoria, in Jan. 1804, and no. 5073. Unfortunately doubt surrounds the provenance of the latter specimen: it is not clear whether it was collected on King's Island on 23 Apr. 1802, at Port Dalrymple in Jan. 1804 or at Arthur's Seat in Jan. 1804. I now select the specimen in BM collected by R. Brown on King's Island, Tasmania, on 23 Apr. 1804 as the lectotype of *P. triangulare*.

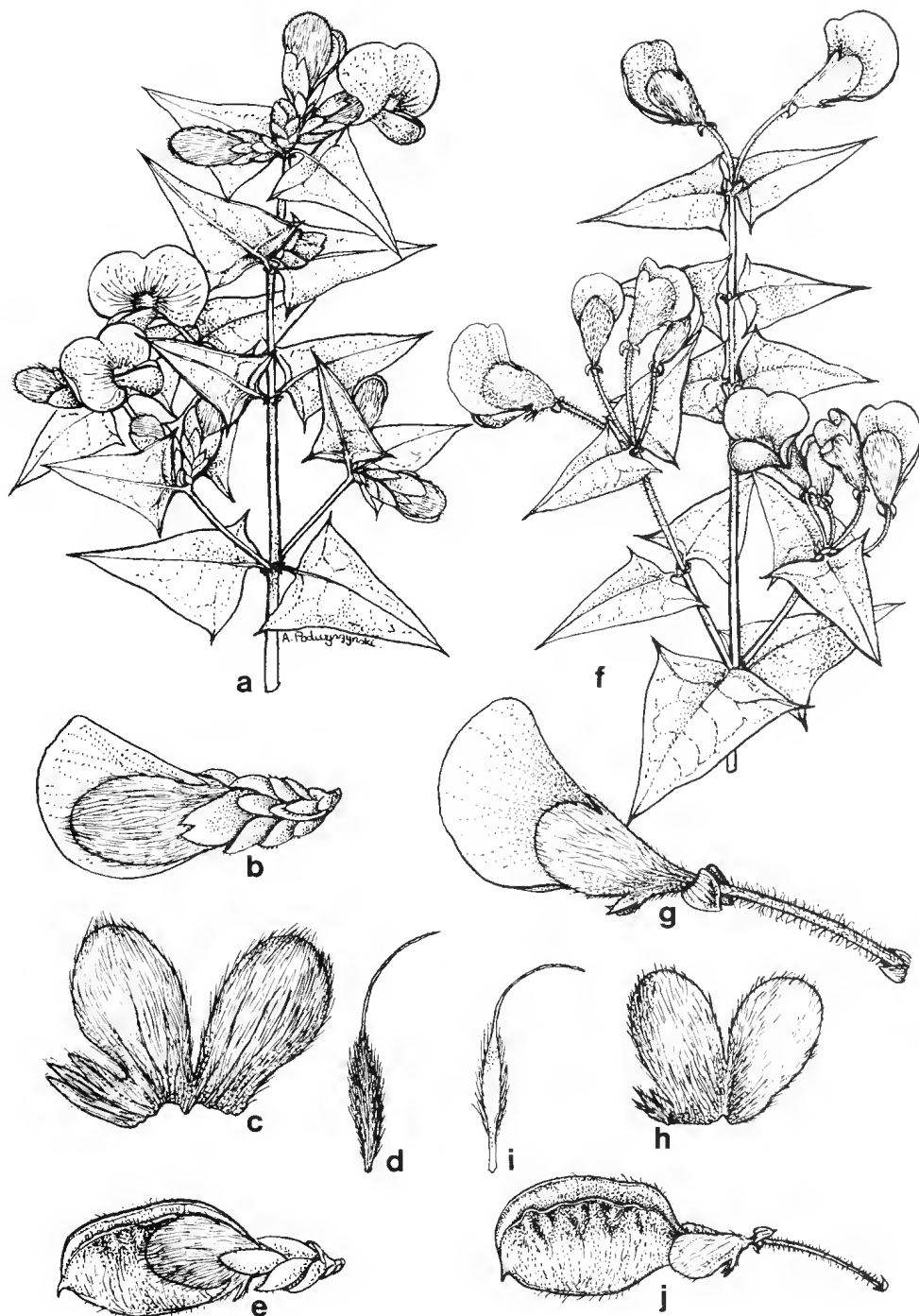


Fig. 4. *Platylobium obtusangulum*. a — flowering twig, x 1; b — flower, showing the short pedicel concealed by imbricate bracts and scales, x 2; c — calyx opened out (upper lobes on right), x 2; d — gynoecium, x 3; e — pod, x 1. *P. triangulare*. f — flowering twig, x 1; g — flower, showing the long pedicel exserted from the basal bracts and scales, x 2; h — calyx opened out, x 2; i — gynoecium, x 3; j — pod, x 1. a-d from J. H. Ross 2475 (MEL 531009); e from A. C. Beaglehole 30037 (MEL 100004); f-i from H. I. Aston 726 (MEL 570858); j from L. Renfrey (MEL 570664).

	<i>P. obtusangulum</i>	<i>P. triangulare</i>
Pedicels	less than 0.5 cm long, completely concealed by the imbricate bracts and scales	0.6-1.8 cm long, exerted from the basal bracts and scales
Bracteoles	7.5-9 × 4-5.5 mm, remaining erect	2-3.7 × 1.5-2 mm, usually reflexed
3 lower calyx lobes	8-9.5 mm long	4.5-6.5 mm long
Ovary	densely villous throughout	glabrous apart from long white hairs on the margins
Pods	sessile and densely pubescent throughout, at least when young	on a stipe 2-4.5 mm and glabrous apart from scattered hairs on the margins

Table 1. Comparison of the diagnostic differences between *P. obtusangulum* and *P. triangulare*.

As R. Brown's description of *P. triangulare* was brief, it is not surprising that the species was confused with the taxon later described by W. J. Hooker as *P. obtusangulum*. The two species are superficially similar and the leaves of *P. obtusangulum* are often as triangular as are those of *P. triangulare*. Diagnostic differences are given in table 1 and these should enable most fertile material of the two species to be distinguished without difficulty. However, on Wilson's Promontory and sporadically elsewhere in Victoria, specimens which have some characteristics of *P. triangulare* and some of *P. obtusangulum* are occasionally encountered. As the relationship of these anomalous specimens appears to be with *P. obtusangulum* rather than with *P. triangulare*, they are discussed under the former species.

**3. *Platylobium obtusangulum* Hook.** in Curtis's Bot. Mag. 60:t.3258 (1833); Benth., Fl. Austr. 2:153 (1864); J. M. Black, Fl. S. Austr. ed. 2:444 (1948); W. Curtis, Stud. Fl. Tasm. 1:141 (1956); J. H. Willis, Handb. Pl. Vict. 2:277 (1973). TYPE: Curtis's Bot. Mag. t.3258 (iconotype).

*P. triangulare* sensu Sims, Bot. Mag. t.1508 (1812); sensu Hook.f., Fl. Tasm. 1:96 (1856), non R.Br.

*P. macrocalyx* Meissn. in Lehm., Pl. Preiss. 1:80 (1844). LECTOTYPE, here selected: Victoria, Port Phillip, 1842, C. LaTrobe (NEU 266741!). ISOLECTOTYPE: NY!.

*P. obtusangulum* var. *spinulosum* J. H. Willis, Muelleria 1:126 (1967); Handb. Fl. Vict. 2:277 (1973). HOLOTYPE: Victoria, Otway Range, on Airey's Inlet to Wensleydale road, ± 3.2 km N. of Forestry Tower at Peter's Hill, 12.xi.1961, M. Allender (MEL 1522466!).

*Shrub* with slender, weak, glabrous to densely villous, trailing, decumbent or erect stems up to 1 m long. *Stipules* ovate, up to 4 × 1.5 mm. *Leaves* opposite, unifoliate or simple, broadly triangular, hastate or trilobate to ovate-cordate, pungent apically, the lateral angles pungent or rounded and obtuse, 1-3 × 0.6-3(3.8) cm, glabrous or minutely scabrid above except when young, lower surface glabrous to densely appressed-pubescent. *Flowers* 1-3 per axil, sessile, the pedicels very short and completely concealed by the imbricate bracts and scales which are glabrous except for the margins or sparingly to densely pubescent throughout, the paired bracteoles below the calyx 7.5-9 × 4-5.5 mm, overlapping the base of the calyx, glabrous except for the margins. *Calyx* densely clothed with long appressed hairs: 2 upper lobes 12-15 mm long (including the basal tube of 3.5-4 mm), 7-8 mm wide, the 3 lower lobes 8-9.5 mm long, all ± the same length, 3-3.5 mm wide. *Corolla: standard* oblate to almost reniform, 12-14 mm long including a claw 3-4 mm long, 16-20 mm wide, emarginate apically, pinkish-red or brownish outside, orange-yellow within with a basal yellow horse-shoe shaped throat surrounded by a reddish zone; *wings* 11-13 mm long including a claw 2-3 mm long, 3-4 mm wide, orange-yellow apically, pinkish-red basally, auricled; *keel* petals 10.5-11 mm long including a claw 2.5-3.5 mm long, reddish apically, white basally, auricled. *Stamens* up to 11 mm long. *Ovary* 5-6 mm long, sessile, densely villous

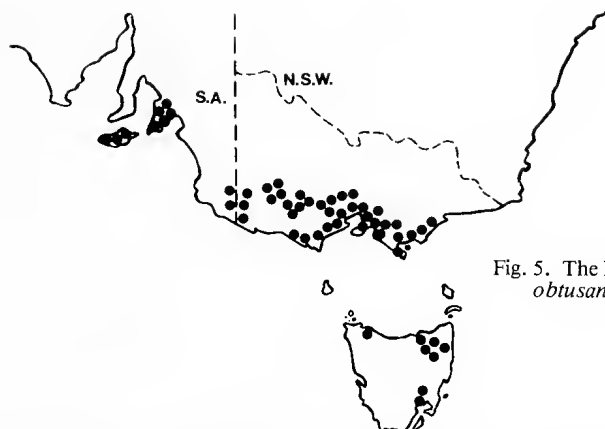


Fig. 5. The known distribution of *Platylobium obtusangulum*.

throughout; style pubescent basally, glabrous above. *Pods* oblong, 1.4-2.5 × 1-1.45 cm, subsessile, with a thin conspicuous wing up to 5 mm wide beyond the upper sutural nerve, 1-5-seeded, pubescent throughout. *Seeds* ellipsoid, 3 × 2.1 mm (Fig. 4).

*P. obtusangulum* occurs in south-eastern South Australia, southern Victoria and Tasmania where it is found most frequently in open woodland and heathland (Fig. 5).

#### REPRESENTATIVE SPECIMENS:

*South Australia* — Kangaroo Island, near Strepera Falls, Middle River, 50 km W. of Kingscote, 14.x.1963, *G. Jackson* 330 (AD 96349102). E. of Penola, 50 km N. of Mt. Gambier, 23.xi.1963, *D. Hunt* 1691 (AD 96405081). Fleurieu Peninsula, Normanville sand dunes, 65 km SSW. of Adelaide, 11.ix.1969, *D. J. E. Whibley* 2913 (AD 97025079).

*Victoria* — Grampians, Mirranatwa Gap, on Dunkeld Rd. 32 km S. of Hall's Gap, 27.ix.1959, *T. B. Muir* 874 (MEL 1522465). Narre Warren East, Wellington Rd., 1 km before turn-off to Cardinia Creek Reservoir, 19.xi.1977, *J. H. Ross* 2475 (MEL 531009). Wilson's Promontory, Tongue Point, on track from Derby Saddle near its junction with track from Derby Beach, 2.xi.1980, *M. G. Corrick* 7071 (MEL 576039).

*Tasmania* — George Town, 23.xi.1842, *R. C. Gunn* (HO 11545). Near Mt. Direction, 23.xi.1842, *R. C. Gunn* (HO 11546). Near Launceston, x.1943, *W. M. Curtis* (HO 11543).

#### NOTES:

Leaf shape in *P. obtusangulum* is extremely variable and quite unreliable as a means of differentiating the superficially similar *P. triangulare*. The differences between the two species are given in table 1.

Willis, *Muelleria* 1:126 (1967), recognised var. *spinulosum* to accommodate a variant from the Otway Ranges, Victoria, with almost rotund leaves which bear 3-7 slender spine-like teeth on the margins. This variant has a very restricted distribution although a similar, but not identical, variant occurs near the Glenelg River. In view of the considerable range of morphological variation encountered within the species, I do not consider this local variant worthy of formal recognition.

On Wilson's Promontory and sporadically elsewhere in Victoria there occur occasional specimens with the pedicels exserted from the basal bracts and scales as in *P. triangulare*, but with large erect bracteoles, large lower calyx lobes and pubescent ovaries as in *P. obtusangulum*. The anomalous specimens, of which Corrick 7069 (MEL 576037) and 7072 (MEL 576036) from Wilson's Promontory are examples, have the general facies of *P. obtusangulum* and differ from it most obviously in the exserted pedicels. Corrick 7069 and 7072 were growing in a population of *P. obtusangulum* and the relationship of these specimens appears to be with *P. obtusangulum* rather than with *P. triangulare*.

4. *Platylobium formosum* Sm., Spec. Bot. New Holl. 1:17, t.6 (1793); Trans. Linn. Soc. Lond. 2:350 (1794); Curtis, Bot. Mag. 14:t.469 (1800); Willd., Sp. Pl. 3:921 (1802); Sm., Trans. Linn. Soc. Lond. 9:302 (1808); DC., Prodr. 2:116 (1825); Paxton, Bot. Mag. 13:195 (1846); Hook.f., Fl. Tasm. 1:96 (1856); Benth., Fl. Austr. 2:153 (1864); F. M. Bailey, Queensland Fl. 2:362 (1900); Curtis, Stud. Fl. Tasm. 1:141 (1956); Burbidge &

Gray, Fl. Austr. Cap. Territ. 213 (1970); J. H. Willis, Handb. Pl. Vic. 2:278 (1973); Beadle et al, Fl. Sydney Region 300 (1973). *P. formosum* var. *typicum* Domin, Biblioth. Bot. 89:728 (1925); *P. formosum* subsp. *formosum* — A. Lee, Contrib. N.S.W. Nat. Herb. 4:97 (1970). LECTOTYPE: here selected: New South Wales, 1793, J. White (LINN, sheet 1188.1); see under notes.

*P. parviflorum* Sm., Spec. Bot. New Holl. 1:18 (1793); Willd., Sp. Pl. 3:921 (1802); Sm., Trans. Linn. Soc. Lond. 9:302 (1808); R.Br. in Sims, Bot. Mag. 37:t.1520 (1813); DC., Prodr. 2:116 (1825); Loddiges, Bot. Cab. 13:t.1241 (1827). *P. formosum* var. *parviflorum* (Sm.) Benth., Fl. Austr. 2:154 (1864); Domin, Biblioth. Bot. 89:728 (1925). *P. formosum* subsp. *parviflorum* (Sm.) A. Lee, Contrib. N.S.W. Nat. Herb. 4:96 (1970). LECTOTYPE, here selected: New South Wales, 1793, J. White (LINN, sheet 1188.3, no. 1); see under notes.

*P. ovatum* sensu DC., Prodr. 2:116 (1825) non *P. ovatum* Andr. (1802).

*P. formosum* var. *cordifolium* Wawra, Itinera Principum S. Coburgi 1:11 (1883). HOLOTYPE: Victoria, Dandenong, Wawra coll. 1, no. 587 (W!).

*Shrub or subshrub* up to 2.5 m high with prostrate, trailing, scrambling or erect stems, the stems glabrous or sparingly to densely clothed with appressed or spreading villous hairs or minutely scabrid from the persistent bases of the hairs. *Stipules* ovate or narrow-ovate, 3.5 × 0.8–2 mm, reddish to dark brown, usually becoming reflexed. *Leaves* invariably opposite but occasionally some or all leaves borne alternately, sessile or on distinct villous petioles up to 2.4 cm long, extremely variable in size and shape, mostly broadly ovate or ovate-cordate to narrowly ovate-lanceolate, apex pungent or mucronate but without lateral angles, (1)2.5–5(7.2) × (0.7)1–2.5(4) cm, coriaceous, conspicuously reticulately veined, upper surface sparingly to densely pubescent when young but glabrous or minutely scabrid when mature, the lower glabrous or densely clothed with long villous hairs, margins flat or revolute. *Flowers* 1–4 per axil, on sparingly to densely villous pedicels 0.6–3.4 cm long, the pedicels exerted from the basal bracts and scales which are usually glabrous except for the margins but are occasionally pubescent throughout, the paired bracteoles below the calyx usually narrow-ovate, 3.5–5.5(8.5) × 1.5–3 mm, glabrous except for the margins or the outer surface partly or entirely clothed with long villous hairs. *Calyx* densely clothed with appressed or slightly spreading hairs: 2 upper lobes 6–12 mm long (including the basal tube of 2.5–6 mm), 3–5.5 mm wide, the 3 lower lobes 3.5–6 × 0.7–1.2 mm, the centre lobe often longest. *Corolla*: *standard* oblate, 9.6–16 mm long including a claw 2–4 mm long, 12–21 mm wide, emarginate apically, yellow within with a basal yellow horse-shoe shaped throat surrounded by a reddish zone; *wings* 8–13 mm long including a claw up to 2.75 mm long, 3.5–5 mm wide, yellow throughout or red basally and yellow apically; *keel* petals 8–12 mm long including a claw up to 2.5 mm long, 3.5–6 mm wide, red apically. *Stamens* 7.5–10 mm long. *Ovary* 5.5–8.5 mm long including a stipe up to 1.75 mm long, densely pubescent throughout or pubescence confined to the sutures or to the sutures and portion of the valves or occasionally entirely glabrous. *Pods* oblong, 1.8–4.3(5.5) × 0.9–2 cm, on a stipe 0.5–1.6 cm long, with a thin conspicuous wing up to 4 mm wide beyond the upper sutural nerve, mostly 4–8-seeded, pubescent throughout or pubescence confined to the sutures or to the sutures and portion of the valves or entirely glabrous. *Seeds* ellipsoid, 2.6–4 × 1.8–2.4 mm (Fig. 6).

*P. formosum* is the most widespread species in the genus occurring from the vicinity of Wide Bay in Queensland southwards along the coast and in the Blue Mountains, Southern Tablelands and South Western Slopes of New South Wales, the A.C.T., Victoria as far west as the Grampians and Tasmania. A common understorey shrub, especially on moister sites (Fig. 7).

#### NOTES:

J. E. Smith's original description of *P. formosum* (1793) drew attention to the diagnostic distinguishing characters of the species, namely, leaflet shape and the degree of pubescence of the ovary. Although described as "cordato-ovate", the leaves illustrated in the plate accompanying Smith's description are hardly cordate basally but this character may be seen in specimens 1188.1 and 1188.2 in Smith's herbarium (LINN) collected by John White in New South Wales in 1793.

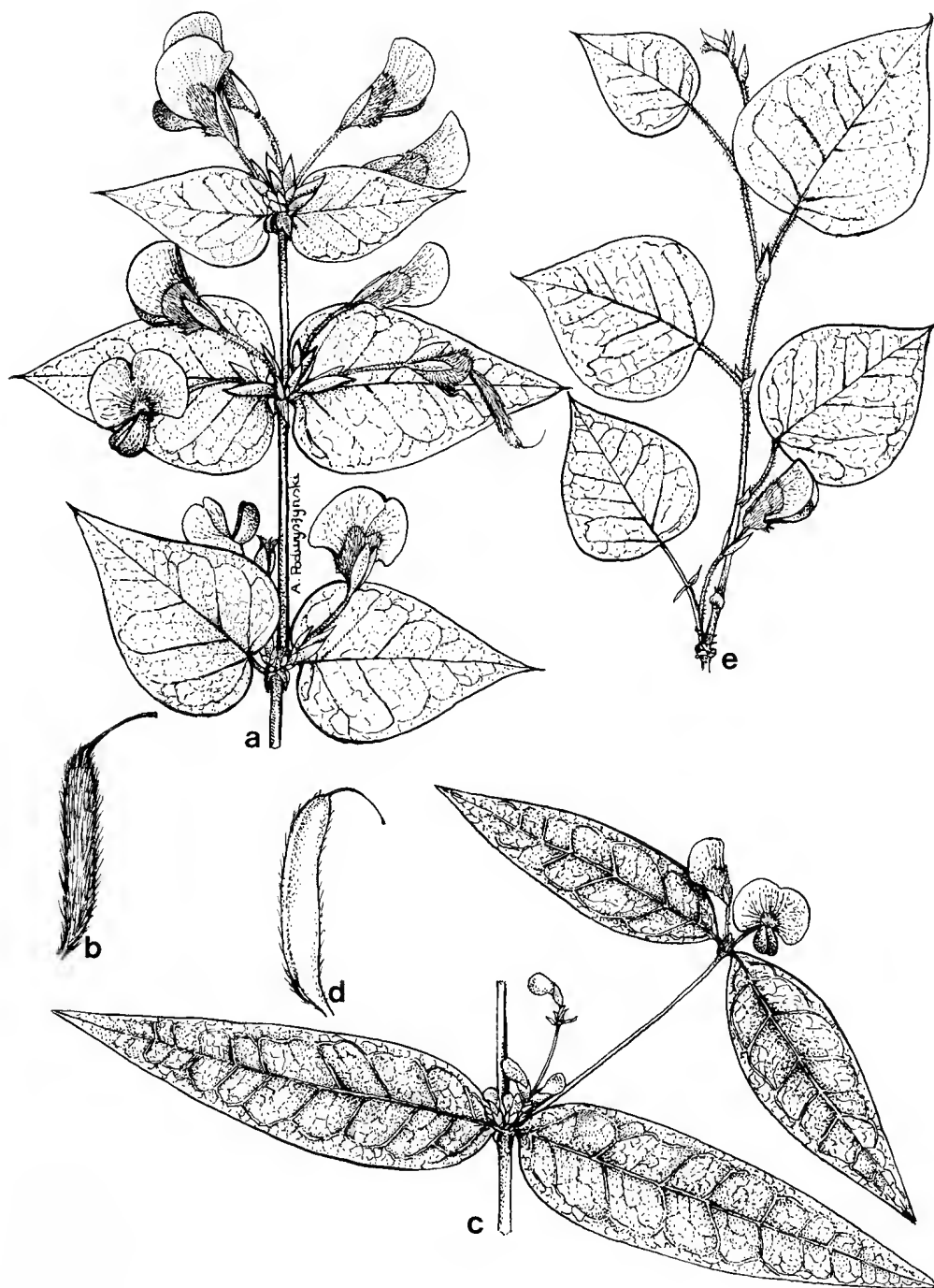


Fig. 6. *Platylobium formosum*. a — flowering twig of typical “*formosum*”, x 1; b — ovary showing pubescence on surface of valves and on the sutures, x 2; c — flowering twig of typical “*parviflorum*”, x 1; d — ovary showing the pubescence confined to the sutures, x 2; e — flowering twig of the Victorian variant with alternate leaves, x 1. a & b from T. B. Muir 3653 (MEL.602925); c & d from N. Ford (NSW 4418); e from H. B. Williamson (MEL 584537).

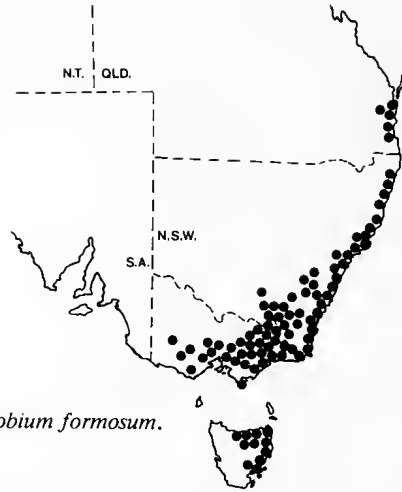


Fig. 7. The known distribution of *Platylobium formosum*.

J. E. Smith (l.c.) distinguished his *P. parviflorum* from *P. formosum* by its "lanceolato-ovate" leaves and glabrous ovaries but the two are conspecific and for a long time have been regarded as such. *P. parviflorum* was accorded varietal rank by Benthams (1864) who lamented that although the variety was usually distinguished by "the narrow leaves, shorter pedicels, smaller flowers, more glabrous bracts, and by the ovary villous near the sutures only and not all over", he found none of the characters constant. Subsequently var. *parviflorum* was raised to subspecific rank (Lee, 1970).

*P. formosum* is a polymorphic species and is particularly variable in leaf shape and size, petiole and pedicel length, and the degree of pubescence, especially of the ovary and pod. In their typical forms, "*formosum*" and "*parviflorum*" are distinctive largely on account of the obvious differences in leaf shape: the former with cordate-ovate leaves less than twice as long as broad and ovaries and pods pubescent on the surfaces of the valves and on the sutures, and the latter with ovate-lanceolate leaves usually more than twice as long as broad and ovaries and pods with pubescence on the sutures only or entirely glabrous. However, the typical forms are linked by numerous and varied intermediates, especially along the coastal belt from Queensland to Tasmania. It is unfortunate that the material available to Smith when he described *P. formosum* came from coastal New South Wales or was raised in England from seed collected in coastal New South Wales as this is an area in which intermediates abound. The leaves illustrated in the plate accompanying the description of *P. formosum* show a definite approach to some of the intermediates.

In response to a request, M. D. Crisp examined the type material of *P. formosum* and *P. parviflorum* housed in LINN and reported that the ovaries in the type of *P. parviflorum* (sheet 1188.3 specimens no. 1) are glabrous except for a few hairs along the sutures, and the ovaries in the type material of *P. formosum* (sheets 1188.1 and 1188.2) are sparsely villous on the surfaces of the valves over the seeds and on the sutures. The two immature pods in specimen 1188.1 are sparsely villous on the surfaces of the valves over the seeds and have a few basal hairs on the upper suture, a condition also found on the two smaller pods in sheet 1188.2. However, the largest pod on sheet 1188.2 is glabrous apart from some hairs on the sutures, a condition frequently met with in *P. parviflorum*. Of the two sheets, 1188.1 (LINN) is here chosen as the lectotype of *P. formosum*.

As reliance is placed on both leaf shape and on the degree of pubescence of the ovary in differentiating "*formosum*" from "*parviflorum*", and, as these characters to some extent vary independently, the two groups are not homogenous within themselves and a number of specimens cannot be placed satisfactorily in either. Attempts to find additional characters to differentiate "*formosum*" from "*parviflorum*" have been unsuccessful.



The variation within *P. formosum* is to some extent regional. Over much of Victoria (E. Gippsland excepted), the interior of New South Wales and the A.C.T. the leaves are invariably distinctly ovate-cordate, less than twice as long as broad, and the ovaries are consistently densely pubescent throughout. These specimens with densely pubescent ovaries are perhaps as different from the lectotype of *P. formosum* as are the specimens with glabrous ovaries referred to "*parviflorum*". Elsewhere, especially in the coastal belt from Queensland southwards to East Gippsland and in Tasmania, a different range of morphological variation is encountered and it is here that difficulties in naming specimens arise. Although typical "*parviflorum*" occurs in the central coastal area of New South Wales, specimens with the facies of "*parviflorum*" but with the ovaries pubescent throughout or pods with hairs on the surfaces of the valves and on the sutures occur quite commonly along the coast and in Tasmania (for example, E. F. Constable (NSW 30259) from Green Cape Lighthouse Rd., N.S.W.; A. H. S. Lucas (NSW 42888) from near Bicheno, Tasmania; F. H. Long 1203 (HO 11535) from near Orielton, Tasmania).

The degree of pubescence of the ovary (pod) is a less reliable character than previous authors believed. Consequently, in some instances it is difficult to know when naming specimens whether to place most emphasis on leaf shape or on pubescence to avoid the unsatisfactory situation where specimens with a similar facies are referred to different infraspecific categories. An example of this difficulty is provided by a distinctive entity with narrowly ovate-lanceolate sessile leaves which occurs from the vicinity of Twofold Bay in New South Wales southwards to East Gippsland, Victoria. Among the specimens from East Gippsland are Muir 1934 (MEL 602809) from near Cann River, Buckland (MEL 584536) from Club Terrace, Beaglehole 62463 (MEL 1508185) from the vicinity of Gelliondale and Lumley G1/3 (MEL 91913) from Mallacoota. All four specimens have a similar facies but the pods of Muir and Buckland have pubescence on the sutures and on the surfaces of the valves whereas the pubescence on the pods of Beaglehole and Lumley is confined to the sutures. On the basis of pod pubescence, Muir and Buckland are thus referable to "*formosum*" and Beaglehole and Lumley to "*parviflorum*" which is most unsatisfactory. It is only by ignoring the degree of pubescence of the pods in these specimens that a meaningful solution is arrived at. However, if the pubescence of the ovary (pod) is discounted always and reliance is placed solely on leaf shape to distinguish "*formosum*" and "*parviflorum*" the placement of many specimens becomes arbitrary and a different set of intermediate specimens is encountered.

The inclusion within *P. formosum* of a slender prostrate or scrambling variant in which some or all of the leaves are borne alternately increases the range of morphological variation encountered within the species. The variant occurs sporadically in Victoria from Mt. Cole in the west to Newby in East Gippsland and typically the specimens have broadly ovate leaves with petioles 0.6-2.8 cm long, flowers borne on pedicels which usually exceed 2 cm in length, and the young growth is often densely clothed with spreading rusty hairs. Examples include H. B. Williamson (MEL 584538) from Mt. Cole and P. R. H. St John (MEL 569732) from between Bayswater and Vermont. Superficially the specimens bear a fairly close resemblance to *P. alternifolium* and in the past have been confused with and referred to this species. However, this variant is readily distinguished from *P. alternifolium* as the calyces and young pods are densely pubescent throughout and the peduncles are exerted from the basal bracts and scales.

As the variation within *P. formosum* is to some extent regional, the usefulness of formally recognising infraspecific categories appears to vary over the distributional range of the species. The Tasmanian material is relatively uniform as far as leaf shape is concerned but the ovaries vary from glabrous to densely pubescent throughout and many of the specimens are difficult to refer to either "*formosum*" or "*parviflorum*" with certainty. In view of this, the recognition of infraspecific categories in Tasmania does not appear to be warranted or particularly useful. On the other hand, in the central coastal areas of New South Wales recognition of infraspecific categories is undeniably useful.

I have been fortunate in having discussed this species with A. T. Lee, National Herbarium of New South Wales, on several occasions and have had access to the material in NSW which she has annotated. Although acknowledging the existence of differential

tendencies in *P. formosum* I prefer not to recognise formal infraspecific taxa. In reaching this decision I have been influenced more by the difficulties encountered in naming many specimens than in the benefits derived from according the extremes formal taxonomic status. The variation within *P. formosum* is imperfectly understood but I believe that it is more complex than is implied by the recognition of two infraspecific taxa.

#### REPRESENTATIVE SPECIMENS of "typical *formosum*":

*Queensland* — Glass House Mountains, Mt. Tunbubudla, 10.viii.1930, C. E. Hubbard 3621 (BRI 270963). *New South Wales* — between Binda and Bigga, N.W. of Crookwell, 14.x.1953, C. W. E. Moore 2665 (CANB 28812, NSW 42927). A.C.T.: Two Sticks Rd., above Brindabella Valley, 8.xi.1961, N. T. Burbidge 7280 (CANB 126420, MEL 602825, NSW 76864). *Victoria* — Sassafras Gap, 40 km N. of Benambra on road to Corryong, 25.xi.1954, H. I. Aston 1273 (MEL 602924). *Tasmania* — Port Sorell, x.1943, W. M. Curtis (HO 11538).

#### REPRESENTATIVE SPECIMENS of "typical *parviflorum*":

*New South Wales* — Pennant Hills, 19.ix.1936, J. Vickery (NSW 42947). Epping, 14.ix.1947, N. Ford (NSW 4418). Lindfield Fire trail towards Lane Cove National Park, 28.ix.1975, J. G. Seur 300 (NSW).

#### REPRESENTATIVE SPECIMENS of "intermediates":

*New South Wales* — Green Cape Lighthouse Rd., 9.x.1954, E. F. Constable (NSW 30259). Fiona Beach, 8 km S. of Forster, 10.x.1961, E. F. Constable 1289 (NSW 100827). *Tasmania* — near Mt. Direction, 19.xi.1842, R. C. Gunn 1016/1842 (NSW 42887). Black Charles Opening, near Orielson, 13.xi.1933, F. H. Long 1203 (HO 11535).

The following key is provided for those who wish to recognise the two subspecies as defined by Lee (1970):

Leaves usually ovate-cordate, length up to twice the breadth; ovary pubescent on the surfaces of the valves and on the sutures; pods pubescent on the sutures and retaining some pubescence on the valves. .... subsp. *formosum*

Leaves usually narrow-ovate, not cordate basally, length more than twice the breadth; ovary glabrous throughout or pubescent on sutures only; pods glabrous or almost so or with pubescence confined to the sutures. .... subsp. *parviflorum*

#### SPECIES INCERTAE

***Platylobium gracile*** Dum.-Cours., Le Botaniste Cultivateur ed. 2, 7:314 (June 1814). Dumont de Courset provided the following description: "Cette espèce a un joli feuillage. Ses tiges et ses rameaux sont très-menus. Ses feuilles rondes avec une pointe courte particuliere, sont parsemées en-dessus de poils rares, et portées sur de courts-petioles. Elles n'ont que 2 à 3 lignes di diamètre. Les fleurs sont petites, jaunes, pédunculées, solitaires, axillaires."

The description is inadequate to positively identify the plant and it is uncertain whether it is even a species of *Platylobium*. No specimen appears to have been preserved and consequently *P. gracile* is rejected as a name of uncertain application.

***Platylobium rotundifolium*** Colla, Hortus Ripulensis 1:110 (1824). The brief description given by Colla is as follows: "Sub hoc nomine missum ab *H. sedy* nullibi enumeratum inveni: parum differre videtur a *P. formoso* (W: sp. III 921). folia tamen sunt orbiculata nec cordata."

The description is inadequate to positively identify the plant and I have not succeeded in tracing a specimen in BR or TO, the herbaria alleged (Stafleu & Cowan, 1976) to house Colla's herbarium, on which the name was based. *P. rotundifolium* is rejected, therefore, as a name of uncertain application.

#### EXCLUDED SPECIES

*Platylobium lanceolatum* Andr., Bot. Repos. 3:t.205 (1802) = ***Bossiaea heterophylla*** Vent., Descr. Plant. Nouv. 1:7, t.7 (1800).

*Platylobium microphyllum* Sims, in Curtis's, Bot. Mag. 22:t.863 (1805) = ***Bossiaea obcordata*** (Vent.) Druce, Rep. Bot. Soc. Exch. Club, suppl. 2, 1916:610 (1917).

*Platylobium obcordatum* Vent., Jardin de la Malmaison 1:t.31 (1804), non DC. (1825) = ***Bossiaea obcordata*** (Vent.) Druce, Rep. Bot. Soc. Exch. Club, suppl. 2, 1916:610 (1917).

- Platylobium ovatum* Andr., Bot. Repos. 4:t.266 (1802), non sensu DC. (1825) = **Bossiaea heterophylla** Vent., Descr. Plant. Nouv. 1:7, t.7 (1800).  
*Platylobium reticulatum* Sieb. ex Spreng., Syst. Veg. ed. 16, 3:231 (1826) = **Mirbelia platyloboides** (DC.) J. Thompson, Proc. Linn. Soc. N.S.W. 83:123 (1959).  
*Platylobium scolopendrium* Andr., Bot. Repos. 3:t.191 (1801) = **Bossiaea scolopendria** (Andr.) Sm., Trans. Linn. Soc. Lond. 9:303 (1808).  
*Platylobium spinosum* Turcz., Bull. Soc. Nat. Mosc. 26:284 (1853) = **Bossiaea spinosa** (Turcz.) Domin, Vestn. Kral. Ceske Spolecn. Nauk., Tr. Mat.-Prir. 1919-22, 2:39 (1923).

#### ACKNOWLEDGEMENTS

I am most grateful to Mr M. I. H. Brooker, CSIRO Division of Forest Research, Canberra, for photographing several type specimens in BM, K and LINN while serving as Australian Botanical Liaison Officer at Kew Herbarium, Royal Botanic Gardens, England, and to his successor, Dr M. D. Crisp, National Botanic Gardens, Canberra, for providing details of the type material of *P. formosum* and *P. parviflorum* housed in LINN; to Mrs A. T. Lee, National Herbarium of New South Wales, for answering a number of enquiries and for several valuable discussions; to Miss A. M. Podwyszynski, National Herbarium of Victoria, for preparing the illustrations that accompany the text; to the Directors/Curators of AD, BRI, CANB, HO, NEU, NSW, NY and W for the loan of specimens or for working facilities in their institutions; and to Mrs R. Parsons for typing the manuscript.

#### REFERENCES

- Audas, J. W. (1921). Through the Balangum Ranges and at Rose's Gap (Grampians). *Vict. Nat.* 38:4-8; 11-16.  
 Benthams, G. (1864). 'Flora Australiensis'. Vol. 2 (Lovell Reeve & Co.: London).  
 Ferguson, I. K. & Skvarla, J. J. (1981). The pollen morphology of the subfamily Papilionoideae (Leguminosae). In R. M. Polhill & P. H. Raven (eds) 'Advances in Legume Systematics'. 2:859-896. (Royal Botanic Gardens: Kew).  
 Lee, A. T. (1970). Taxonomic notes on *Platylobium*, *Bossiaea* and *Templetonia* in New South Wales. *Contrib. N.S.W. Natl. Herb.* 4:96-105.  
 Polhill, R. M. (1976). Genisteae (Adans.) Benth. and related tribes (Leguminosae). In V. H. Heywood (ed.) 'Bot. Syst.' 1:143-368. (Academic Press: London).  
 Polhill, R. M. (1981). Tribe 26. Bossiaeeae (Benth.) Hutch. In R. M. Polhill & P. H. Raven (eds) 'Advances in Legume Systematics'. 1:393-395. (Royal Botanic Gardens: Kew).  
 Stafleu, F. A. & Cowan, R. S. (1976). 'Taxonomic Literature'. Vol. 1. (Bohn, Scheltema & Holkema: Utrecht).



# A REVISION OF ANGIANTHUS WENDL., SENSU LATO (COMPOSITAE: INULEAE: GNAPHALIINAE), 1

by  
P. S. SHORT\*

## ABSTRACT

*Angianthus* Wendl. (sensu Benth., 1867) has been revised. Eight genera, *Cephalosorus* A. Gray (monotypic), *Chrysocoryne* Endl. (6 species), *Dithyrostegia* A. Gray (monotypic), *Epitriche* Turcz. (monotypic), *Hyalochlamys* A. Gray (monotypic), *Pleuropappus* F. Muell. (monotypic), *Pogonolepis* Steetz (6 or 7 species) and *Siloxerus* Labill. (3 species) are reinstated. Three species with uncertain affinities, *A. axilliflorus* W. V. Fitzg. ex Ewart & J. White, *A. burkittii* (Benth.) J. M. Black and *A. connatus* W. V. Fitzg. are excluded from the above genera.

Fifteen species are recognised within *Angianthus* s. str. Four of these, *A. cornutus*, *A. cyathifer*, *A. glabratus* and *A. prostratus* are described as new. *A. brachypappus* var. *conocephalus* J. M. Black is raised to specific rank. Three of the 6 species of *Chrysocoryne*, *C. multiflora*, *C. tridens* and *C. trifida* are also described as new.

The following new combinations are made: *Cephalosorus carpesioides* (Turcz.) Short, *Epitriche demissus* (A. Gray) Short and *Pogonolepis lanigera* (Ewart & J. White) Short.

The majority of genera dealt with have no obvious close affinities with one another but all are referred to the subtribe Gnaphaliinae.

## CONTENTS

Generic history .....	143
Relationships of <i>Angianthus</i> and segregate genera .....	144
Materials and methods .....	146
Morphology .....	146
Presentation of data .....	152
Key to segregate genera and species of <i>Angianthus</i> sensu lato .....	153
Genera	
<i>Angianthus</i> sensu stricto .....	153
<i>Pleuropappus</i> .....	179
<i>Epitriche</i> .....	181
<i>Cephalosorus</i> .....	182
<i>Chrysocoryne</i> .....	185
<i>Dithyrostegia</i> .....	201
<i>Hyalochlamys</i> .....	202
<i>Pogonolepis</i> .....	203
<i>Siloxerus</i> .....	204
Species of uncertain affinity .....	209
Names of uncertain application .....	210
Acknowledgements .....	210
References .....	211
Index to genera and species of Compositae .....	212

## GENERIC HISTORY

Wendland (?1808 or 1809, see Stafleu, 1967), when describing the new genus *Angianthus* recognised a single species, *A. tomentosus*. No further species were attributed to the genus until Mueller described the closely related *A. brachypappus* in 1855. Then in 1867 Benth., as well as describing several new species of *Angianthus*, placed the following genera in synonymy (arranged chronologically in taxonomic and nomenclatural groups): *Siloxerus* Labill. (1806), including the emendations *Styloncerus* Spreng. (1826) & *Ogcerostylus* Cass. (1827); *Cylindrosorus* Benth. (1837); *Phyllocalymma* Benth. (1837); *Skirrhoporus* DC (1838); *Eriocladium* Lindl. (1839); *Chrysocoryne* Endl. (1843); *Pogonolepis* Steetz (1845); *Piptostemma* Turcz. (March 1851), *Cephalosorus* A. Gray (April 1851); *Hyalochlamys* A. Gray (April 1851); *Dithyrostegia* A. Gray (April 1851), *Gamozygis* Turcz. (Oct. 1851); *Epitriche* Turcz. (Oct. 1851) and *Pleuropappus* F. Muell. (1855). In justifying this procedure Benth. (l.c., p. 561) stated that the genera had "been established chiefly upon minute distinctions in the pappus which appear to me to afford a much better specific than generic character".

\*National Herbarium of Victoria, Birdwood Avenue, South Yarra, Victoria 3141.

*Muelleria* 5(2): 143-183 (1983).

Bentham realised that the same *Siloxerus* had priority over *Angianthus* but because the former name was at complete variance with the etymology given by the author and both Cassini's (1827) and Sprengel's (1826) emendations of *Ogcerostylus* and *Styloncerus* respectively were more recent names than *Angianthus*, he chose the latter name. Ostenfeld (1921) and Ising (1922) made a number of new combinations with *Siloxerus* but in 1940 the International Botanical Committee on Nomenclature approved the conservation of *Angianthus* against *Siloxerus*.

Prior to Bentham (l.c.) the most important work on the group was by Gray (1851). As well as describing a number of new taxa based on collections made by James Drummond in Western Australia Gray produced a conspectus of the Division Angiantheae (= subtribe Gnaphaliinae p.p., see below). He recognised 22 genera within the group. Seven of these, namely *Cephalosorus*, *Chrysocoryne*, *Dithyrostegia*, *Hyalochlamys*, *Phyllocalymma*, *Siloxerus* and *Skirrhophorus* were ultimately referred to *Angianthus* by Bentham (l.c.). Despite Bentham's above-mentioned statement it is clearly evident that Gray did not place undue emphasis on pappus type but also differentiated the genera on characters such as size shape and number of capitular bracts and general involucre bracts, the shape of the compound heads or glomerules and the number of florets per capitulum. Such characters have also been used to a large extent in the current work and indeed in this revision only *Phyllocalymma* and *Skirrhophorus* sect. *Skirrhophorus* (sensu Gray) are retained in *Angianthus* s.str. Although in some cases modified, *Chrysocoryne*, *Cephalosorus*, *Dithyrostegia*, *Hyalochlamys* and *Siloxerus* are reinstated. The genus *Pogonolepis* Steetz, treated by Gray as a section of *Skirrhophorus*, is also reinstated whereas *Skirrhophorus demissus* A. Gray, referred to section *Psuedopappus* A. Gray, is referred to the genus *Epitriche* Turcz.

It is clear from Turczaninow's (1851) work within the group that he too had similar generic concepts to Gray. In fact several genera described by Turczaninow and Gray are nomenclatural synonyms. This is a result of both workers basing many of their descriptions on duplicate collections made by Drummond.

Several workers (e.g. Mueller, 1889; Ostenfeld, 1921) were critical of Bentham's treatment of *Angianthus* but none the less his concepts have been generally followed in current Australian literature. Ewart & White (1909), attributed two further taxa, *A. lanigerus* and *A. axilliflorus* to the genus. Neither species remotely resemble *Angianthus* s.str. as circumscribed in the current work. *A. lanigerus* is a species of *Pogonolepis* while *A. axilliflorus*, like Fitzgerald's (1905) species *A. connatus*, lacks affinity with any of the segregate genera of *Angianthus* s.l. On the other hand the only other species described since Bentham and up to the present time, *A. acrohyalinus* Morrison (1912), undoubtedly belongs to the genus.

A single species, *Gnephosis burkittii* Benth. was transferred to *Angianthus* by Black (1929).

Only Gardner (1931), in a census of Western Australian plants, attempted to divide the genus. He recognised three sections. Two, namely section *Spicatae* Gardn. and section *Pyramidatae* Gardn., are invalid names while the remaining one, section *Skirrhophorus* (DC.) Gardn., is misapplied. Gardner merely listed the various species under each section, placing *A. cunninghamii*, the type species of *Skirrhophorus* DC., under section *Pyramidatae* Gardn.

In this revision the following genera, commonly placed in synonymy with *Angianthus*, have been reinstated: *Cephalosorus*, *Chrysocoryne*, *Dithyrostegia*, *Epitriche*, *Hyalochlamys*, *Pleuropappus*, *Pogonolepis* and *Siloxerus*. Three species, namely *A. axilliflorus*, *A. burkittii* and *A. connatus* are excluded from *Angianthus* s.str. as their relationships are obscure.

#### RELATIONSHIPS OF ANGIANTHUS AND SEGREGATE GENERA

In his description of the subtribe Angianthinae Bentham (1867, p. 556) wrote: "Flower-heads small, sessile or nearly so on a common receptacle in dense clusters or compound heads, often closely surrounded by imbricate bracts or by a few floral leaves forming a general involucre. Florets all tubular and hermaphrodite." Within Australia he

recognised eight genera within the subtribe, namely *Angianthus* Wendl., *Calocephalus* A. Gray, *Chthonocephalus* Steetz, *Craspedia* Forst.f. (also occurs in New Zealand), *Gnaphalodes* A. Gray (= *Actinobole* Fenzl ex Endl., see Eichler 1963), *Gnephosis* Cass. and *Myriocephalus* Benth.. Subsequently Bentham (1873a) also referred the Indian *Caesulia* Roxb. and the African *Eriosphaera* Less. to the Angianthinae. A similar procedure was also followed by Hoffman (1894) although he excluded *Eriosphaera* and included monotypic *Dimeresia* A. Gray (North America) and *Decazesia* F. Muell. (Australia). Black (1929) also included *Eriochlamys* Sond. & F. Muell. ex Sond. and *Basedowia* Pritzl in the subtribe.

Prior to Bentham (1867, 1873) the majority of the genera listed above were similarly grouped together on the basis of their compound head and usual general involucre in the "Division Angiantheae" of the "Subtribe Gnaphalieae" (De Candolle, 1836, 1838; Gray, 1851).

Recently Merxmuller, Leins and Roessler (1977), making much use of new data derived from investigations of pollen (Besold, 1971; Leins 1971, 1973), the stylar structure of hermaphroditic florets and chromosome numbers, have suggested that only 3 subtribes, i.e. Inulinae, Gnaphaliinae and Athrixiinae be recognised within the tribe. This contrasts sharply with the 9 subtribes recognised by Bentham (1873a) and commonly used in current works. Merxmuller *et al.* (l.c.) have referred the above-mentioned Australasian genera of the Angianthinae to an "*Angianthus* group" within the Gnaphaliinae. They have also tentatively included the Australian genera *Stuartina* Sond. and *Nablonium* Cass. in the group.

Although the alignment of the various genera with others such as *Helichrysum* Miller and *Helipterum* DC. seems reasonable the "*Angianthus* group" is nevertheless artificial. Merxmuller *et al.* (l.c.), like past workers, have, I believe, placed too much emphasis on the presence of pseudocephalia or compound heads. Thus they stated that "their [the pseudocephalia] distribution does not look irregular [within the Inuleae], as most of the taxa concerned can be arranged in well delimited taxonomic groups. This has been accepted for a long time in the *Angianthus* group . . ." (p. 589). Studies of the variation exhibited in the general receptacle, achene and bract morphology of *Angianthus* s.l. alone make it very clear that many of the segregate genera, e.g. *Pogonolepis* and *Siloxerus*, are but distantly related to *Angianthus* s.str. A similar situation appears to occur in the apparent unnatural genera *Calocephalus*, *Chthonocephalus*, *Gnephosis* and *Myriocephalus*, (in the sense of Bentham, 1867). For example *Blennospora* A. Gray, commonly placed in *Calocephalus* but clearly with little affinity with that genus, should be reinstated (Short, 1981a, b).

The artificiality and indeed impracticality of the use of the compound head as a criterion for subtribal recognition may also be seen in the monotypic genera *Eriochlamys* and *Cephalipterum*. *Eriochlamys behrii* Sond. & F. Muell. ex Sond., like the majority of the "*Angianthus* group" has tubular, hermaphroditic florets but the capitula may be single or aggregated into compound heads. Bentham (1867, 1873a) placed the genus in subtribe Gnaphaliinae but Black (1929) referred it to the Angianthinae. The complex species (Short, 1981c) *Cephalipterum drummondii* A. Gray contains capitula with tubular female and male florets. It has obvious affinities with species of *Helipterum*, particularly *H. sterilescens* F. Muell., but on the basis of the presence of compound heads is placed in the Angianthinae or "*Angianthus* group" thus suggesting only a distant relationship with members of *Helipterum*.

The occurrence of compound heads in so many species is perhaps the result of selection for more efficient pollination or for a shorter life cycle. A reduction in life span is perhaps the most likely factor as perhaps all but four of the c. 80 species in the "*Angianthus* group" (excluding *Craspedia*) are annuals living in semi-arid to arid conditions. Such a hypothesis not only helps to explain the observed aggregation of capitula in the "*Angianthus* group" but may also help to explain the presence of varying degrees of aggregation of capitula in the inflorescences of many closely related species of the ill-defined genera *Gnaphalium* L., *Helichrysum* and *Helipterum*.

Hence, although agreeing with Merxmuller *et al.* (1977) that the subtribe Angianthinae be abolished and that *Angianthus* and other genera included in the

Angianthinae by Bentham (1867) be placed within the Gnaphaliinae, I cannot, at least under current definition, agree with the maintenance of an "*Angianthus* group". Further revisions within this group are required before the relationships of the many genera can be determined.

#### MATERIALS AND METHODS

Descriptions of taxa were made from dried herbarium material and to a lesser extent from specimens stored in 70% alcohol. In many cases measurements were made from all available specimens, these usually being fewer than 30 per species. Where more specimens existed collections were selected on a regional basis, care being taken to include the full range of morphological variation. Shapes were defined using the terms given by the Systematics Association Committee for Descriptive Terminology (1962).

Specimens were obtained from the following herbaria: AD, BRI, CANB, CBG, GH, K, KP (Kings Park, Western Australia), KW, MEL, NSW, NT, PERTH, and UWA (abbreviations after Holmgren & Keuken, 1974). Much material was also obtained by the author on field trips to Western Australia in August-September 1977 and November 1979 and on a number of trips in South Australia and Victoria during 1977-1980. A complete set of collections from these trips is housed in AD.

When possible, publication dates of all works have been checked with Stafleu (1967) and Stafleu & Cowan (1976, 1979). Publication dates for the *Bull. Soc. Imp. Naturalistes Moscou* were provided by Dr Hj. Eichler (pers. comm., 1978). Turczaninow (1851) described new species in a paper published in volume 24 of that journal. The volume consists of 2 parts and 4 numbers. Part 1, number 1 contains the first part of the above paper and according to the published records (*Bull. Soc. Imp. Naturalistes Moscou* 24(1):705) was presented to the meeting of the Society on 15 March 1851. This is accepted as the date of publication. Part 2, number 3 contains the second part of the paper and was presented to the Society on 25 October 1851 (*Bull. Soc. Imp. Naturalistes Moscou* 24(2):625). As in the above case this is also accepted as the date of publication. Accurate publication dates had to be obtained as both Turczaninow and Asa Gray (1851) published new species, based on duplicates of the same collections, in the same year. Gray published in three fascicles of *Hook. J. Bot. Kew Gard. Misc.* The fascicles were published in April, May and June of 1851 (Stafleu & Cowan, 1976).

#### MORPHOLOGY

As pointed out by Heywood (1971) and Heywood *et al.* (1977) the uniformity of inflorescence, floral and fruit structure within natural families such as the Umbelliferae, Cruciferae and Compositae tend to make the recognition of genera difficult. In some cases apparently trivial characteristics have been used to define generic limits. For example various studies (e.g. De Jong, 1965; King & Robinson, 1966) within the Compositae have shown that the pappus type has frequently been given too much weight in the recognition of genera. It is essential to look at a wide range of characters before deciding generic limits. In the current work the segregate genera and species of *Angianthus* s.l. have been recognised on the basis of a combination of a number of morphological characteristics, some of which are unique. For example the oblique scale-like pappus of *Pleuropappus* is, within *Angianthus* s.l., unique to that genus. Furthermore the oblique achene and the number and arrangement of capitula-subtending bracts are also unique to *Pleuropappus* (fig. 1h).

In general a single, unique, generically diagnostic character, or a unique combination of characteristics, is used in the key to the segregate genera and species of *Angianthus* s.l. The characteristics of each genus are also briefly outlined following each generic description.

The use of various characters in Composite taxonomy has been discussed by a large number of workers. Perhaps the most useful and best known study was made by Bentham (1873b). The various features used in delimiting genera and species of *Angianthus* s.l. are discussed below.



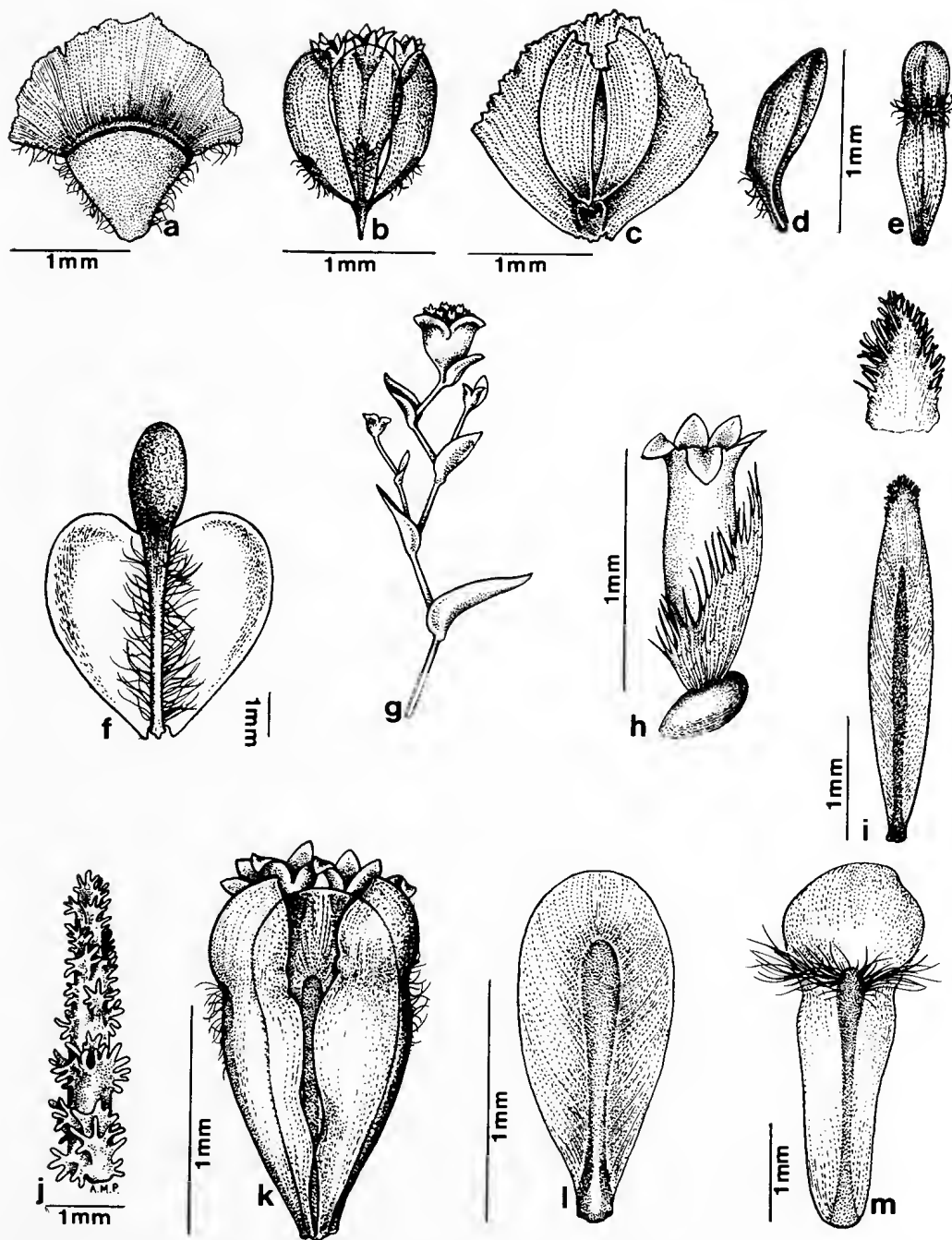


Fig. 1. Characteristics of *Angianthus* and segregate genera. a — capitulum-subtending bracts of *Chrysocoryne pusilla* (Short 902). b — capitulum of *C. pusilla* (Short 902). c — capitulum and capitulum-subtending bract (inner view) of *C. drummondii* (Short 1085). d-e — capitular bracts of *C. pusilla* (Short 902). f — bracts subtending compound head of *Hyalochlamys globifera* (Short 636). g — habit of *Dithyrostegia amplexicaulis*, x 1 (Short 344). h — floret of *Pleuropappus phyllocalymmeus* (Wilhelmi s.n., MEL 541617). i — capitular bract of *Pogonolepis stricta* (Short 1053). j — general receptacle of *Angianthus tomentosus* (Short 1075). k — arrangement of capitular bracts in *A. glabratus* (Short 905). l — capitulum-subtending bracts of *A. glabratus* (Short 905). m — capitulum-subtending bract of *A. milnei* (Short 473).

## a. HABIT:

With the exception of *Angianthus cunninghamii*, a perennial shrub, all species examined in the current work are annuals. Habit characteristics are useful for distinguishing a number of closely related species. For example within *Chrysocoryne* one species, *C. tridens*, never branches from the upper nodes of major axes but other species commonly do so.

## b. LEAVES:

The majority of taxa have alternate leaves but there are exceptions. Within *Angianthus* some species possess a few opposite basal leaves whereas some specimens of *A. preissianus* have entirely opposite leaves. The distinctive *A. connatus* and the monotypic *Cephalosorus* are characterised by possessing some opposite leaves. The latter taxon is also the only genus with petiolate leaves.

Leaf shape is more or less constant within any one genus although specific differences exist, e.g. the conduplicate leaves and hyaline apices of *Angianthus acrohyalinus* are unique within the genus. At the generic level the monotypic *Dithyrostegia* and *Cephalosorus* have unique leaf types.

The nature of the leaf indumentum is of value at both generic and specific levels. For example in all species of *Chrysocoryne* and in monotypic *Hyalochlamys* at least some scale-like glandular hairs are found on the leaves. Such trichomes are absent from other genera. The glabrous or nearly glabrous nature of the leaves of some species of *Angianthus* is also useful for distinguishing some species.

## c. COMPOUND HEADS:

All species included by Bentham (1867) in *Angianthus* are said to possess compound heads or glomerules, i.e. the individual capitula are clustered together to form a compact inflorescence usually resembling either a capitulum or a spike. Such inflorescences often possess a general involucre of bracts. Recent workers such as Leppick (1977) have referred to such structures as synflorescences or conflorescences but the term compound head, used in current Australian floras and readily understood, is retained in this work.

The ancestral nature of the inflorescence or compound head in all genera examined is unknown and probably can only be ascertained following anatomical studies at different stages of development. At least in *Angianthus* s.str. the compound heads appear to have been derived from a compound inflorescence, perhaps a compound corymb. This is supported by the fact that in most species of *Angianthus* with oblong to cylindrical heads distinct minor receptacular axes (fig. 1j) are more or less evenly distributed along a single major axis. Two or more capitula are usually attached to each minor receptacular axis and, although difficult to ascertain, it also appears that the outermost capitula of each minor axis commonly possess more than one capitulum-subtending bract.

The arrangement of capitula in the compound head and the nature of the general receptacle furnish very useful, often diagnostic, generic characteristics. For example the general receptacles of *Siloxerus* and *Dithyrostegia* are covered with long silky hairs whereas the receptacle in other genera is glabrous. In *Chrysocoryne* and *Pleuropappus* the capitula are arranged in a regular spike-like fashion along the axis but most species of *Angianthus* have distinct minor receptacular appendages distributed along the major axis. The size and shape of the compound heads provide useful characters for distinguishing many species of *Angianthus*, *Chrysocoryne* and *Siloxerus*.

## d. BRACTS:

The bracts of the general involucre, the capitulum-subtending bracts, capitular bracts and the paleae provide some of the best diagnostic characters for distinguishing the genera and to a lesser extent species.

d.1. GENERAL INVOLUCRE (bracts subtending compound heads). The number and shape of the bracts of the general involucre are of much use in distinguishing the genera *Cephalosorus*, *Dithyrostegia*, *Hyalochlamys* and *Pogonolepis*. For example in *Dithyrostegia* the compound head is enclosed by two overlapping or connate leaf-like bracts (fig. 1g), a condition not found in other genera. In contrast all species of

*Chrysocoryne* lack a conspicuous involucre. In *Angianthus* the bracts provide useful characters for distinguishing species.

d.2. **CAPITULUM-SUBTENDING BRACTS.** The term capitulum-subtending bract appears to have been applied by Bentham (1867) to a usually singular bract occurring on the adaxial side (relative to the major axis of the general receptacle) of a capitulum of many species of *Angianthus* s.l. It appears that such bracts, under Bentham's definition, could resemble the capitular bracts. For example he recognised such bracts as occurring in both *A. humifusus* (= *Siloxerus humifusus*) and *Angianthus strictus* (= *Pogonolepis stricta*). However the present studies suggest that no such bracts should be recognised. In *Siloxerus* the capitula themselves are difficult to recognise and both receptacular and capitular bracts are similar in appearance. In *Pogonolepis* all bracts within the centre of a compound head have similar morphologies and it would appear that the inner papillose bracts of the general involucre have been interpreted by Bentham as capitulum-subtending bracts. The capitulum-subtending bracts are therefore best defined as a bract or several bracts which occur on one side of a capitulum (usually very obviously the adaxial surface relative to the centre of the general receptacle) only and differ in their appearance from at least some of the capitular bracts. Thus in *Chrysocoryne* (figs. 1a-e; 10c-f, j) the capitulum-subtending bracts are extremely dissimilar to all capitular bracts. In contrast the more or less flat capitulum-subtending bracts in both *Angianthus* and *Pleuropappus* are similar to the inner flat capitular bracts but are quite distinct from the outer pair of concave capitular bracts of these genera (fig. 11-m).

The capitulum-subtending bracts are undoubtedly modified bracts which originally subtended the capitula in ancestral plants with only loosely arranged inflorescences of capitula. Their role in the compound head is presumably one of protection of developing florets and to some extent the attraction of pollinators. The function of protecting developing florets and fruit is perhaps best illustrated in *Chrysocoryne* where the bracts more or less enclose the capitula.

d.3 **CAPITULAR BRACTS.** The capitular bracts, i.e. the involucre bracts of a capitulum, furnish many characters which are important in distinguishing genera. For example the bracts of *Pogonolepis* are unique in that they possess papillae at their apex (fig. 1i). Similarly the rigid, opaque, thick-cell walled bracts of *Siloxerus* are unique to that genus. In other cases the number and arrangement of the bracts is important in distinguishing genera. With the exception of *Angianthus microcephalus*, all species of *Angianthus* have four capitular bracts arranged so that two outer, variably concave bracts surrounded two inner flat bracts (fig. 1k). The same arrangement occurs in monotypic *Pleuropappus*.

Although the majority of segregate genera have constant and unique features in relation to the capitular bracts the genus *Chrysocoryne* is distinctive in the degree of variation exhibited in the number, arrangement and morphology of the bracts. Three of the six species have similar bracts, i.e. *C. drummondii* (figs. 1c; 9; 10j), *C. tridens* and *C. uniflora* each have two, concave, capitular bracts with shortly ciliate margins. In the remaining species the bracts are quite different. *C. trifida* also has only two capitular bracts but they have long hairs on the upper margins (figs. 9; 10l) and are smaller than those found in the three preceding species. Both *C. multiflora* and *C. pusilla* have from 2 to c. 10 bracts per capitulum. The laminae on the bracts of *C. pusilla* (figs. 1e; 9; 10f) distinguish that species from all others in the genus.

Within *Angianthus* the 4 capitular bracts, particularly the inner flat bracts, frequently exhibit specific differences. For example in several species a wing-like extension extends from the adaxial surface of the midrib of the inner bracts (fig. 3e) while in others the inner bracts are abruptly attenuated in the lower  $\frac{1}{2}$  to  $\frac{1}{3}$  of the bract (fig. 3d).

It seems reasonable to suggest that the major role of the capitular bracts in all species examined is the protection of the developing florets and achenes. Presumably the colour and number of these bracts, plus the capitulum-subtending bracts, are also important in making the capitula more attractive to likely pollinators. However in *Angianthus* s.l. the general lack of large, coloured laminae, which are found in many species of genera such as *Helipterum*, *Helichrysum* and *Calocephalus*, suggests that in many species this latter

role is only minor. It seems likely that the role of attracting pollinators is more a function of the compound head. Given that protection is probably the major function of the capitular bracts it is not surprising that in many genera the number, morphology and arrangement of bracts is more or less constant. That is, a successful combination of bract characters which ensures floret and achene development has a high selective value and only comparatively minor modifications (such as the degree of development of the wing-like extension in *Angianthus*) have occurred.

The variation found in the capitular bracts of *Chrysocoryne* obviously does not support this argument, at least at first sight. However, this variation is readily explained. Firstly, there is a marked trend in the genus to a reduction in the number of florets per capitulum (see proposed phylogeny in generic treatment). This decreases the need for a large number of capitular bracts and in fact a decrease in bract number is correlated with a decrease in the number of florets per capitulum. Secondly, and perhaps more importantly, the capitulum-subtending bracts are extremely well developed in this genus (figs. 1a, c; 9; 10c; h, j, m). In all species they more or less completely cover the capitula and obviously give great protection to the developing florets, thus decreasing the importance of the capitular bracts in this function.

d.4. PALEAE. Within *Siloxerus* the florets in all species are subtended by a single bract which resembles the capitular bracts. Paleae are not found in other genera.

e. FLORETS:

The florets of all species are more or less morphologically uniform, i.e. they are all tubular, bisexual and yellow. The most important difference occurs in the number of corolla lobes per floret.

Gardner (1977) noted that approximately 80 genera of Compositae include species with tri- and/or tetramerous disc florets. He suggested that a change from a 5 to 3 or 4-lobed state is either related to a change in breeding system, i.e. from chasmogamy to autogamy, or to selective pressure for increased seed production. As previously outlined (Short 1981a, b) in all members of the Australian Gnaphaliinae so far examined species with predominantly or entirely tri- and/or tetramerous florets are inbreeders. Closely related species with pentamerous florets have been classed as outbreeders. Indeed lobe-number is an extremely important character for distinguishing closely related species in *Chrysocoryne* and *Angianthus*.

The length of the corolla tube, i.e. the length from the base of the floret to the base of the lobes, the diameter of the floret tube and the presence or absence of a basal tubular swelling have been recorded for all species but appear to be of little or no taxonomic significance. In many cases the degree of swelling is related to the age of the floret, the swelling becoming pronounced only in mature florets.

f. STAMENS:

The anthers of all members of the Inuleae are said to be tailed and this appears to be the case in all members of *Angianthus* s.l. Various workers (e.g. Robinson & King, 1977) have found that characteristics of the filament collar and the anther appendage provide taxonomically useful characteristics. Such differences have not been closely examined in the current work but the only apparent differences in anther morphology are found between related outbreeding and inbreeding species. Outbreeding species have normal tetrasporangiate anthers whereas related inbreeding species have bisporangiate anthers. Furthermore the anther sacs of inbreeders are about one-half the length of those in outbreeders.

g. POLLEN:

It is clear from the works of Besold (1971), Leins (1971, 1973), Merxmüller *et al.* (1977) and Skvarla *et al.* (1977) that detailed studies of pollen structure will be of considerable use in clarifying generic relationships within the Inuleae. In the current work pollen grains of *Angianthus* s.l. have not been anatomically examined. However it has been found that the number of pollen grains per anther or floret is a very useful character for distinguishing species. As previously pointed out (Short 1981a, b) the pollen-ovule ratio (P/O), which in the hermaphroditic species examined is equal to the number of

pollen grains per floret, reflect a plant's breeding system. In the genera examined there are a number of closely related outbreeding and inbreeding taxa with vastly different P/O values. For example the average P/O of *Chrysocoryne tridens* is 48.6 but that of the closely related *C. uniflora* is 1,775.5. Indeed pollen grain number, along with the number of lobes per floret and the size and morphology of the anthers, provide the best, if not the only characteristics for reliably distinguishing some closely related taxa.

#### h. PAPPUS:

Pappus characteristics are of much use at both the generic and specific level. For example the oblique scale-like pappus of *Pleuropappus* readily distinguishes it from all other genera included in *Angianthus* by Bentham (1867). In *Siloxerus* the three species have a pappus of jagged scales joined at the base or a jagged ring with more or less indistinct scales. In contrast an array of pappus types occurs in *Angianthus* s.str. Here some species such as *A. milnei*, *A. prostratus* and *A. pygmaeus* completely lack a pappus but others such as the apparently closely related taxa *A. tomentosus*, *A. cyathifer* and *A. acrohyalinus* have very distinctive types.

The pappus is generally regarded as a modified calyx commonly made up of scales or variably plumose bristles which occur at the apex of the achene. Normally, it is not difficult to discern the pappus but difficulties arise in both *Epitriche demissus* and *Angianthus eriocephalus*. In the former case it is difficult to tell from the few specimens available whether in fact a pappus should be recognised. Long hairs appear to occur over much of the apex of the fruit and possibly the lower portion of the floret. The apparent irregular, scattered distribution of the hairs suggests that they are not to be regarded as a pappus but merely as part of the indumentum of the achene. A similar case occurs in *A. eriocephalus* (= *A. preissianus*). Bentham (1867) recorded that a minute pappus occurs in this taxon. However the 'pappus' is nothing more than a cluster of papillae at the apex of the achene. The small papillae are found scattered over much of the fruit.

#### i. ACHENES:

The majority of Australian works refer to the Composite fruit as an achene. However in recent literature, for example in the various papers included in Heywood, Harborne and Turner (1977), some workers refer to the fruit as a cypsela. Originally the term achene was defined by Necker (1790) to include all dry, indehiscent, one-seeded fruits, irrespective of their derivation from an inferior or superior ovary. De Candolle (1813) redefined the term to include only those fruits derived from an inferior ovary. Subsequently Mirbel (1815) introduced the term cypsela for the same type of fruit. That is an achene is, in the sense of De Candolle's definition, equivalent to a cypsela. Wagenitz (1976) has proposed that De Candolle's definition, which is generally accepted in German texts, be commonly adopted. It is accepted in the present work.

Features of achene morphology promise to be of great value in defining generic limits within the Australian Gnaphaliinae. Detailed anatomical studies have not been made by the present author but examination of achenes at even low magnification (10-40x) clearly shows that at least some genera possess distinctive, often unique fruit. Thus both *Chrysocoryne* and *Siloxerus* are readily distinguished from other segregate genera of *Angianthus* s.l. by the small, more or less obovoid, variably papillate, pink or purple achenes which lack obvious epidermal mucilaginous cells. In contrast others such as *Pogonolepis* and *Cephalosorus* are surrounded by mucilaginous cells. The achene of monotypic *Dithyrostegia* is readily distinguished by its clothing of long papillae or hairs. The monotypic genera *Hyalochlamys* and *Pleuropappus* also have distinctive, unique achenes. In the former genus the carpopodium (the point of attachment to the receptacle), is the most distinctive feature, being represented by a distinct white band of cells. In *Pleuropappus* the fruit is obliquely attached to the corolla tube (fig. 1h).

Features such as size and shape, colour, presence or absence of mucilaginous cells and shape of the carpopodium are thus useful in distinguishing genera. However detailed anatomical studies of the achenes of *Angianthus* s.l. are highly desirable. Heywood and Humphries (1977), for example, have found in the Anthemideae that characters such as the presence or absence of epicarpic glands and secretory canals, the number of layers and the degree of thickening of the epicarp and mesocarp and the orientation of the

cotyledons are all characteristics which show systematically useful variation. Although anatomical studies in *Angianthus* s.l. may only support the current classification based on more obvious features such studies may be useful in determining relationships of the various genera throughout the Gnaphaliinae. Detailed anatomical studies of achenes will be essential before the many genera of Australian Gnaphaliinae are satisfactorily delimited and their relationships understood.

The function of the mucilaginous cells in the fruit of many species of *Angianthus* s.l. is open to question. Some authors (e.g. Schodde, 1963; Roth 1977) have suggested that the sticky nature of many wet fruits is important in fastening the achenes to the soil particles during germination. This may be so for some species but as Roth (1977) has suggested slime cells may also constitute a water storage tissue. This could be very important in germination, particularly in view of the semi-arid to arid environment inhabited by many of the species of *Angianthus* s.l. Another possibility is that the cells and their degree of water uptake and/or period of hydration are associated with some mechanism in breaking dormancy. That is, the seeds will probably only germinate when sufficient external moisture is available for growth. In such a situation the water retained by the slime cells is of little importance.

#### PRESENTATION OF DATA

When describing new species a number of workers, particularly F. Mueller, cited locality details which differed to some extent from those occurring on labels accompanying specimens which are (as indicated by notes etc.) obviously type material. When citing type specimens in the current work both the published data and data on original collection labels are usually cited.

Usually type material of most taxa was available and generally when necessary it has been possible to select lectotypes. However this is not the case for material used by Turczaninow. Holmgren and Keuken (1974) list KW, CW and LE as having important Turczaninow collections. A request for type material of seven species from CW has not been acknowledged and none exists in LE. Only four of the required type specimens exist in KW. Although duplicates of all collections cited by Turczaninow exist outside Russia there is no reason to believe that any of these were examined by him. Thus types housed in KW are tentatively referred to as holotypes.

Steetz (1845) described a number of taxa, including *Phyllocalymma filaginoides*, *Skirrhophorus preissianus*, *Styloncerus cylindraceus* and *Styloncerus suberectus*, in Lehmann's "Plantae Preissianae". Type specimens of these taxa occur in GH, LD, MEL and S. The only type collection in GH is *Preiss 37*, the type of *P. filaginoides*. It is in F. W. Klatt's herbarium. Types of all taxa are in MEL, having come from two main sources (possibly the only sources but this is unclear), namely from O. W. Sonder's herbarium purchased toward the end of the nineteenth century (Court, 1972) and from Steetz's herbarium purchased in about 1859 (Mueller, 1888). Specimens in LD and S presumably come from Lehmann's herbarium. The major part of Lehmann's collection was acquired by Andersson for Stockholm in 1860-61 (Nordenstam, 1980). Types of *S. preissianus*, *P. filaginoides* and *S. cylindraceus*, are in S and all have collection labels in Preiss's hand and the name in Steetz's hand. Type collections of all four taxa are housed in LD and are similarly labelled.

When offering Lehmann's herbarium for sale Klatt stated in an advertisement in *Bonplandia* (8(8):143, 15 April 1860) that "the Preiss herbarium contains the originals of the Plantae Preissianae with the labels of the botanists who worked on this flora, as well as the 'unica' of the Preiss collections" (English translation by Mrs D. M. Sinkora). Nordenstam (1980) similarly referred to "the original specimens of *Plantae Preissianae*" (p.282) as being sold to J. Agardh in Lund. Such statements suggest that the principal types of all species are to be found in LD. However it is clear that this is not the case for the above-mentioned taxa described by Steetz. The collections from his herbarium now at MEL undoubtedly should be selected as the lectotypes. Steetz, in his own hand, stated on the sheets that he purchased the specimens of each taxon in 1843. He also recorded Preiss's collection data on the sheets and clearly designated them as new taxa by adding

“nobis!” after each name. Furthermore the sheets from Steetz’s herbarium contain as good, or much better material than those in LD, S, or the collections at MEL obtained with Sonder’s herbarium.

Unless it is otherwise indicated, by reference to microfiche, photographs or the use of the abbreviation ‘n.v.’, it should be assumed that all specimens, types or otherwise, cited in this paper have been seen by the author.

#### KEY TO SEGREGATE GENERA AND SPECIES OF ANGIANTHUS SENSU LATO

1. General involucre consisting of 2 leaf-like, overlapping or connate bracts which more or less enclose the capitula (fig. 1g) ..... 6. *Dithyrostegia*
1. General involucre absent or inconspicuous or if well developed consisting of more than 2 bracts
  2. Capitular bracts with papillae at the apex (fig. 1i) ..... 8. *Pogonolepis*
  2. Capitular bracts lacking papillae at the apex
    3. Leaves opposite (at least in lower ½ of plant) and distinctly petiolate; laminae 1-2.5 cm long, 0.4-1 cm wide ..... 4. *Cephalosorus*
    3. Leaves alternate or if opposite then lacking petioles and less than 0.3 cm wide
      4. Achene obliquely attached to floret; pappus an oblique scale (fig. 1h) ..... 2. *Pleuropappus*
      4. Achene not obliquely attached to floret; pappus absent or not an oblique scale
        5. Paleae present, the bracts resembling the capitular bracts, whitish, ± opaque and with thick cell walls ..... 9. *Siloxerus*
        5. Paleae absent
          6. Plants prostrate; compound heads woolly; pappus consisting of 8-12 barbed bristles united in a short ring at the base ..... 1. *Gnephosis burkittii*
          6. Plants not with the above combination of characters
            7. Base of floret or apex of achenes with long hairs
              8. Capitular bracts 4-5; capitulum-subtending bract distinct, rigid and opaque .... 1. *Angianthus connatus*
              8. Capitular bracts 2 or 3; capitulum-subtending bracts absent ..... 3. *Epitriche*
            7. Base of florets or apex of achenes without long hairs
              9. Bracts of general involucre with a leaf-like midrib and broad, hyaline, wing-like margins (fig. 1f), the bracts about the length of the compound heads ... 7. *Hyalochlamys*
              9. Bracts of general involucre absent or not as above
                10. Compound heads with c. 10 capitula; capitulum-subtending bracts rigid and leaf-like ..... 1. *Angianthus axilliflorus*
                10. Compound heads usually with more than c. 10 capitula (commonly 30-several hundred); capitulum-subtending bracts primarily hyaline
                  11. Capitulum-subtending bracts morphologically ± similar, except for the concave nature of some, to the capitular bracts (fig. 1k-m); achenes brown ..... 1. *Angianthus*
                  11. Capitulum-subtending bracts totally unlike the capitular bracts (fig. 1a-e); achenes pink or purple ..... 5. *Chrysocoryne*

1. **Angianthus** Wendl., Collect. Pl. 2:31 (?1808); DC., Prodr. 6:150 (1838); Steetz in Lehm. Pl. Preiss. 1:438 (1845); Benth., Fl. Austr. 3:560 (1867) p.p.; Benth. in Benth. & Hook. f., Genera Pl. 2:319 (1873) p.p.; Hoffman in Engler & Prantl, Natürl. Pflanzenfam. IV (5):193 (1890) p.p. TYPE: *A. tomentosus* Wendl.

*Cassinia* R. Br. in W. & W. T. Aiton, Hort. Kewensis 2nd ed. 5:184 (1813), non *Cassinia* R. Br., Trans. Linn. Soc. London 12:126 (1818) *nom. cons.* TYPE: *C. aurea* R. Br. (= *A. tomentosus* Wendl.)

*Cylindrosorus* Benth., Enum. Pl. 62 (1837); DC., Prodr. 6:151 (1838). TYPE: *C. flavescens* Benth. (= *A. tomentosus* Wendl.)

*Phyllocalymma* Benth., Enum. Pl. 61 (1837); DC., Prodr. 6:150 (1838); Steetz in Lehm. Pl. Preiss. 1:436 (1845). TYPE: *P. micropodioides* Benth. (= *A. micropodioides* (Benth.) Benth.)

*Skirrhophorus* DC. in Lindl. ex DC., Prodr. 6:150 (1838); DC. in Lindl., Nat. Syst. Bot. 2nd ed. 260 (1836) nomen nudum; DC. in Deless., Icon. Select. Pl. 4:22, t. 51 (1840) ('*Skirrhophorus*'); Steetz in Lehm. Pl. Preiss. 1:438 (1845); A. Gray, Hook. J. Bot. Kew

Gard. Misc. 3:147 (1851) p.p. (as to sect. *Skirrhophorus*). TYPE: *S. cunninghamii* DC. (= *A. cunninghamii* (DC.) Benth.)

*Eriocladium* Lindl., Edwards' Bot. Reg.: Swan River Append. 24 (1839). TYPE: *E. pyramidatum* (= *A. cunninghamii* (DC.) Benth.)

[*Cephalosorus* auct. non A. Gray: see synonymy of *A. microcephalus*.]

[*Siloxerus* auct. non Labill.: see synonymy of *A. brachypappus* & *A. tomentosus*.]

[*Styloncerus* auct. non Spreng., nom. illeg.: various species, as to combinations of Kuntze, Rev. Generum Pl. 367 (1891).]

*Annual herbs* (or perennial shrub, *A. cunninghamii* only). Major axes prostrate, decumbent, ascending or erect, glabrous or hairy; stems simple or forming major branches at basal and/or upper nodes; major axes often developing minor shoots. *Leaves* usually alternate (sometimes opposite), sessile, entire, hairy (sometimes almost glabrous), often with a small hyaline appendage at the apex. *Compound head*  $\pm$  ellipsoid or lanceoloid to depressed ovoid; bracts subtending compound heads commonly inconspicuous and much less than c.  $\frac{1}{4}$  the length of the head (sometimes the bracts c. the length of the head), the outer ones leaf-like, the inner ones with hyaline apices; *general receptacle* cylindrical to  $\pm$  oblong or ovoid to broadly depressed ovoid, consisting of a single major axis with minor receptacular axes distributed  $\pm$  evenly over it. *Capitula* 20-200(c. 1500) per compound head, each capitulum with 1(4) abaxial, hyaline subtending bracts that overlap the capitular bracts. *Capitulum-subtending bracts* narrowly elliptic to elliptic or narrowly oblong to oblong or lanceolate to ovate or oblanceolate to obovate; laminae rarely with a distinct constriction in the upper parts; midrib usually conspicuous, opaque, extending c.  $\frac{1}{3}$  to  $\frac{1}{2}$  the length of the bract, glabrous or variably hairy, sometimes with a few glandular hairs present. *Capitular bracts* 4 (*A. microcephalus* with 2 or 3 only), hyaline, with an opaque midrib, arranged so that 2 outer, variably concave bracts (always present) surround 2 (absent or 1 only in *A. microcephalus*) inner flat bracts. Concave bracts with the lamina variably constricted in the upper half; midrib usually conspicuous and extending c.  $\frac{1}{3}$  to  $\frac{1}{2}$  the length of the bracts, glabrous or variably hairy, sometimes a few glandular hairs present. Inner flat bracts narrow elliptic to elliptic or narrowly oblong or oblanceolate to obovate, tapering gradually to the base or conspicuously attenuated in the lower  $\frac{1}{2}$  to  $\frac{1}{3}$ ; lamina not or variably constricted in the upper half; midrib usually conspicuous, elongate and extending c.  $\frac{1}{3}$  to  $\frac{1}{2}$  the length of the bract, glabrous or variably hairy, sometimes a few glandular hairs present, sometimes with an entire or dissected wing-like extension from the adaxial surface. *Florets* (1)2(3) per capitulum; corolla (3, 4)5-lobed; style branches truncate; stamens (3, 4) 5, with tailed anthers. *Achenes* ellipsoid or  $\pm$  obovoid, glabrous or variably papillose or pubescent. Pappus setose, paleaceous, coroniform or absent.

#### DISTRIBUTION (Fig. 2):

Of the 15 species of *Angianthus* only *A. brachypappus* and *A. glabratus* are absent from Western Australia and 11 are endemic to that state.

#### ECOLOGY:

Four or five species are restricted to saline depressions but the majority occupy a wider range of habitats.

#### AFFINITIES/GENERIC CHARACTERISTICS:

The genus is characterised by the usual presence of two inner flat bracts and two outer concave bracts per capitulum (fig. 1k), the presence of one, rarely two or three, capitulum-subtending bracts per capitulum, the usual occurrence of two florets per capitulum and the usual presence of minor receptacular axes on the general receptacle (fig. 1j).

The affinities of the genus appear to be with the monotypic genera *Pleuropappus* and *Epitriche*. Both *Pleuropappus* and *Angianthus* have morphologically similar capitular and capitulum-subtending bracts, but *P. phyllocalymmeus* is readily distinguished by the oblique nature of the pappus and achene. Furthermore the capitula in this species are arranged in a spike-like fashion (i.e. they do not have distinctive minor receptacular appendages) and there are four distinctively arranged capitulum-subtending



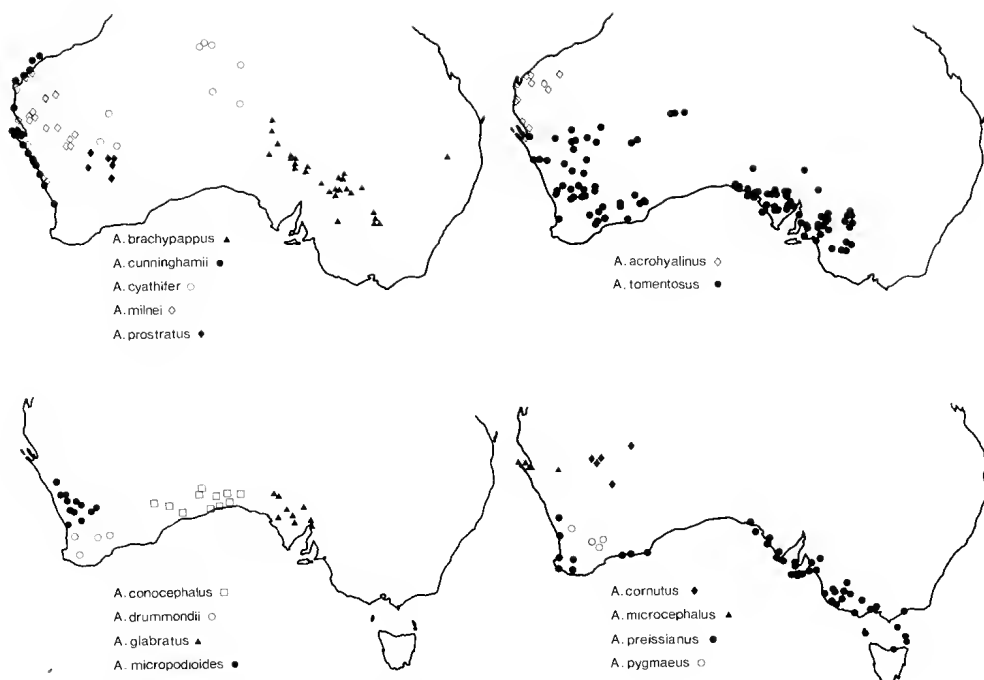


Fig. 2. Distribution of species of *Angianthus*.

bracts per capitulum. The capitular bracts of *Epitriche* are also morphologically similar to those of *Angianthus* but *Epitriche* is readily distinguished by the lack of minor receptacular appendages, the apparent absence of capitulum-subtending bracts and the distinctive ring of hairs at the apex of the achene.

#### EVOLUTION/REPRODUCTIVE BIOLOGY:

Within the genus a number of species are very closely related. The annual species with large, usually more or less oblong compound heads mostly differ from each other only in aspects of the pappus, size and morphology of the capitular bracts and habit. Thus *A. acrohyalinus*, *A. brachypappus*, *A. cornutus*, *A. conocephalus*, *A. cyathifer*, *A. glabratus*, *A. milnei* and *A. tomentosus* appear to form a species cluster. Not far removed are *A. micropodioides*, which has a somewhat reduced compound head and pubescent achenes, and *A. microcephalus*. The latter species also has a somewhat reduced compound head but unlike other taxa the two inner capitular bracts are absent. In all other aspects the species undoubtedly belongs to *Angianthus*. A further species, *A. prostratus*, also has affinities with species such as *A. cornutus* and *A. conocephalus*. The remaining annual species, namely *A. drummondii*, *A. pygmaeus* and *A. preissianus* also form a small species cluster (see under respective species).

The only perennial species, *A. cunninghamii*, is a coastal shrub found in Western Australia. The perennial habit plus the occasional presence of three florets per capitulum suggest that the species may be a rather primitive member of the genus.

With the exception of *A. preissianus* all members of the genus have pollen-ovule ratios of several thousand, i.e. they all appear to be outbreeders. In contrast the average P/O of 119.7 recorded for *A. preissianus* clearly reflects its inbreeding nature (Short 1981a, b).

A number of species, e.g. *A. tomentosus*, *A. milnei* and *A. acrohyalinus*, are capable of producing compound heads containing from 500 to about 2,000 capitula, although under natural conditions they produce relatively few seeds. For example

*A. tomentosus*, a species known to be self-compatible, may only set about 100 seeds per compound head. Although actual seed set may be dependant upon a number of parameters it is possible that the low actual:potential seed ratio is a result of selection for maintenance of a showy inflorescence, the prime purpose of which is to attract pollinators.

In self-incompatible and partially self-incompatible species it is obviously important to attract potential pollinators. Similarly in predominantly self-pollinated species it is also often advantageous to cross-pollinate. A compact inflorescence may be more conspicuous to insect pollinators than an open inflorescence or very small, compact inflorescences, particularly if plants are sparsely spread throughout a population. Furthermore any increase in the time spent and/or a change in foraging pattern by insects when on large, compact inflorescences as compared to small and/or more open inflorescences may also increase the likelihood of pollination, whether it be self- or cross-pollination. Thus the cost of maintaining a large inflorescence may be off-set by a higher degree of pollination. Alternatively, considering the semi-arid to arid environment inhabited by the above species the actual seed set may be regulated primarily by moisture availability and hence longevity of a plant. Thus it could be expected that actual seed set will only approach potential seed set in years of high rainfall. In dry conditions many seeds and in fact many florets may fail to develop because of water stress.

In contrast to the outbreeding species, *A. preissianus* appears, as expected, to produce a full complement of apparently mature, viable seed.

Keighery (1981) has noted that meat ants (*Iridomyrmex* spp.) are common flower visitors and pollen vectors of *A. conocephalus*. Flies and ants are commonly found on flowering plants of all species and are possibly the main pollen vectors in the genus.

#### KEY TO SPECIES OF ANGIANTHUS SENSU STRICTO

1. Perennial shrub; major axes 20-50 cm long (west coast of Australia, normally on fore-dunes, sometimes in coastal saline flats) ..... 15. *A. cunninghamii*
1. Annual herb; major axes 5-30(44.5) cm long
  2. Florets 1 per capitulum, flat capitular bracts absent or rarely 1 per capitulum . . . 11. *A. microcephalus*
  2. Florets 2 per capitulum; flat capitular bracts 2 per capitulum
  3. Pappus absent
    4. Midrib of capitular bracts with hairs  $\frac{1}{3}$  to  $\frac{1}{2}$  the length of the bract . . . . . 10. *A. prostratus*
    4. Midrib of capitular bracts glabrous or with hairs less than c.  $\frac{1}{3}$  the length of the bract
      5. Bracts subtending compound heads inconspicuous or less than c.  $\frac{1}{2}$  (rarely to c.  $\frac{3}{4}$ ) the length of the head (if up to c.  $\frac{3}{4}$  then the inner capitular bracts with horn-like basal appendages); compound heads  $\pm$  ovoid or narrowly ellipsoid to ellipsoid
        6. Flat capitular bracts usually abruptly attenuated in the lower  $\frac{1}{3}$  and with horn-like basal appendages (fig. 3f); compound heads ovoid . . . . . 9. *A. cornutus*
        6. Flat capitular bracts gradually tapering toward the base and lacking basal appendages (fig. 3c); compound heads narrowly ellipsoid to ellipsoid
          7. Capitulum-subtending bracts with the lamina constricted in the upper part and the midrib  $\pm$  densely hairy toward the apex (fig. 3b) . . . . . 2. *A. milnei*
          7. Capitulum-subtending bracts without a constriction in the upper part and with the midrib glabrous or sparsely hairy toward the apex . . . . . 2. *A. milnei*\*
    5. Bracts subtending compound heads c. equal to or exceeding the length of the head; compound heads broadly ovoid to broadly depressed-ovoid
      8. Flat capitular bracts lacking an entire wing-like extension from the adaxial surface of the midrib . . . . . 8. *A. micropodioides*\*
      8. Flat capitular bracts with an entire wing-like extension from the adaxial surface of the midrib (fig. 3e) or if absent then the florets 3- or 4-lobed
        9. Florets 3- or 4-lobed; pollen grains 16-60 pollen grains per anther . . . . . 14. *A. preissianus*
        9. Florets (4)5-lobed; pollen grains c.350-500 per anther
          10. Major axes prostrate; compound heads broadly depressed to ovoid . . . . . 13. *A. pygmaeus*
          10. Major axes erect; compound heads broadly to very broadly ovoid . . . . . 12. *A. drummondii*\*

3. Pappus present
  11. Bracts subtending compound heads c. equal to, or exceeding, the length of the head †
    12. Pappus of 5 or 6 jagged scales, each scale terminating in a single smooth or minutely barbellate bristle (Fig. 3k) ..... 8. *A. micropodioides*
    12. Pappus a cup of scales or a small ring
      13. Flat capitular bracts with a wing-like extension from the adaxial surface of the midrib (fig. 3e) ..... 12. *A. drummondii*
      13. Flat capitular bracts lacking a wing-like extension from the adaxial surface of the midrib ..... 8. *A. micropodioides*\*
  11. Bracts subtending the compound heads inconspicuous or less than c. ¼ the length of the head (sometimes reaching c. ¼ the length of the head in *A. brachypappus*)
    14. Leaves (at least the upper ones) conduplicate, often incurved at the apex and with a distinct hyaline appendage; pappus of 4-6 bristles, barbellate in the lower ½, united into a small, slightly toothed ring at the base (fig. 3g) ..... 1. *A. acrohyalinus*
    14. Leaves not conduplicate; pappus not as above
      15. Pappus of 2 or 3 jagged scales, each scale terminating in 1 or 2 terminally subplumose bristles extending the length of the corolla (fig. 3h) ..... 5. *A. tomentosus*
      15. Pappus a jagged cup (of ± distinct scales) or a ring
        16. Leaves almost glabrous, succulent and cylindrical when fresh ..... 4. *A. glabratus*
        16. Leaves conspicuously hairy, usually not succulent
          17. Flat capitular bracts tapering gradually to the base; compound heads ± narrowly ellipsoid to ellipsoid
            18. Pappus a small, jagged ring (Cliff Head — Jurien Bay region, Western Australia) ..... 2. *A. milnei*\*
            18. Pappus cup-shaped, jagged, often appearing as 2-4 distinct scales (SW. corner Northern Territory and possibly central Western Australia) ..... 3. *A. cyathifer*
          17. Flat capitular bracts abruptly attenuated in lower ⅓-½ (fig. 3d); compound heads usually narrowly ovoid to ovoid, sometimes ± narrowly ellipsoid to ellipsoid
            19. Leaves usually oblanceolate, sometimes linear or narrowly elliptic, 1-3(3.2) cm long, 0.1-0.5 cm wide; pappus a jagged cup, 0.15-0.7 mm long, often with 1 or 2 bristles extending ½-¾ the length of the floret (fig. 3j) (eastern South Australian Queensland, New South Wales, western Victoria) ..... 6. *A. brachypappus*
            19. Leaves ± linear, rarely oblanceolate, 0.5-1.5(1.7) cm long, c.0.1 cm wide; pappus a jagged ring 0.1-0.3 mm long (fig. 3i) (Nullarbor Plain region) ..... 7. *A. conocephalus*

A number of collections, referred to in the key above as *A. milnei*\*, *A. micropodioides*\* and *A. drummondii*\*, are to some extent atypical of the species to which they are referred and under which their diagnostic features are outlined. They possibly represent distinct taxa but further collections are required to substantiate this view.

1. ***Angianthus acrohyalinus*** Morrison, J. Bot. 50:167 (1912); Grieve & Blackall, W. Aust. Wildfls 812 (1975). TYPE: "Globe Hill Station and Minderoo, Ashburton River, October." LECTOTYPE (here designated): *Morrison s.n.*, Globe Hill, Ashburton River, 6.x.1905 (PERTH). SYNTYPE: *Morrison s.n.*, Minderoo, Ashburton R., 11.x.1905 (K).

*Annual herb*, (6)10-30 cm high. Major axes erect or ascending, flexuose, hairy; stem often simple in the smaller plants, to c. 7 cm high, but usually forming major branches at basal and/or upper nodes. *Leaves* alternate, lanceolate, flat to conduplicate, apex often incurved, (0.3)1-6(7) cm long, (0.2)0.3-0.6(0.8) cm wide, the lower ones slightly mucronate, the rest usually with a distinctive hyaline appendage at the apex, all leaves

†Since the completion of the manuscript for this revision a collection *Newbey 9154* from c. 72 km NNW of Bullfinch, Western Australia, has been drawn to my attention. It appears to represent a distinct species of *Angianthus*. It is an annual, has 2 florets per capitulum, a pappus of 2-3 scales, each of which terminates in a single, minutely barbellate awn extending the length of the corolla, and the bracts subtending the compound heads are about equal to or exceeding the length of the compound head. It keys out to lead 12 in the key to species.

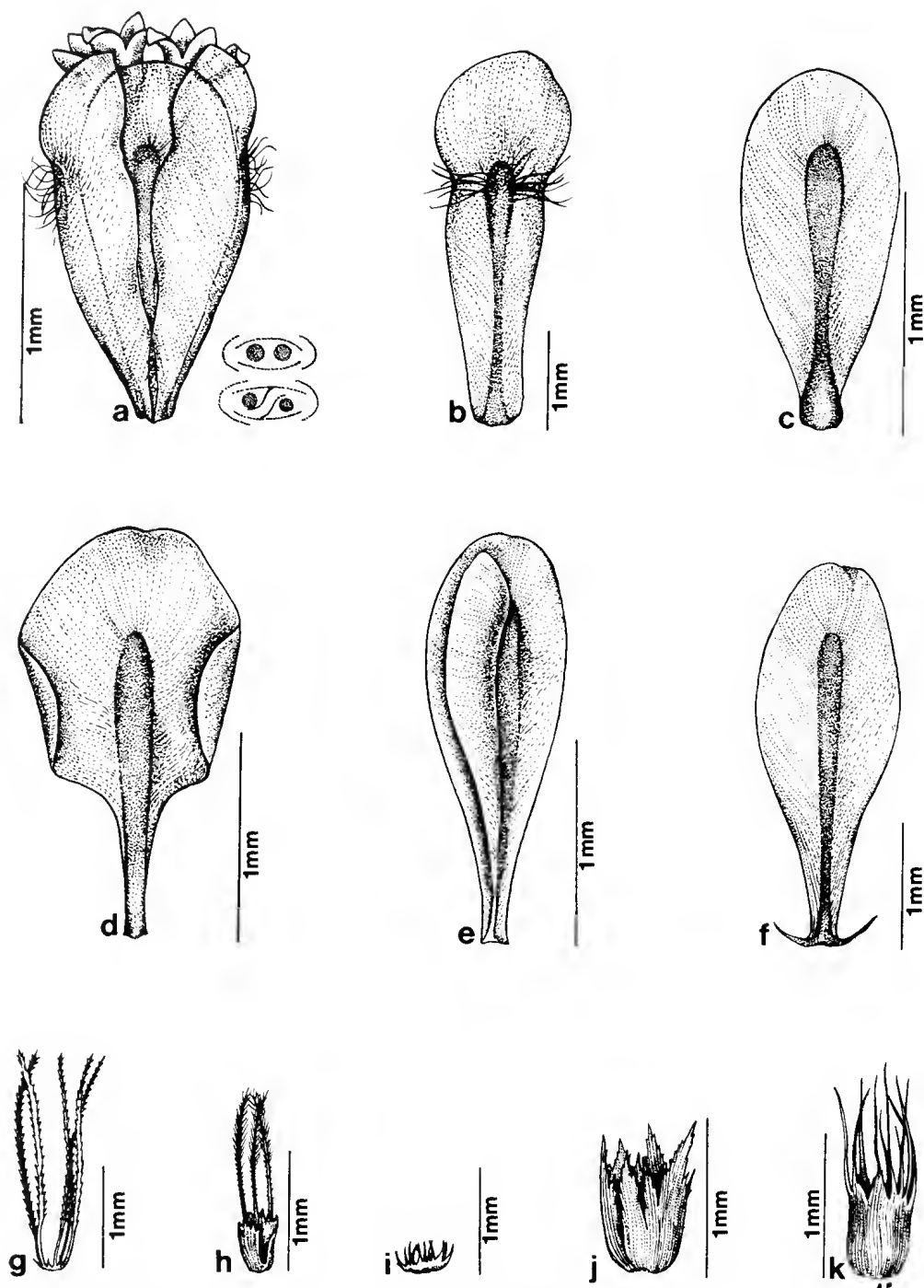


Fig. 3. Characteristics of *Angianthus*. a — general arrangements of capitular bracts (*A. glabratus*, Short 905). b — capitulum-subtending bract with the lamina constricted in the upper part (*A. milnei*, Short 473). c — capitulum-subtending bract lacking constriction (*A. glabratus*, Short 905). d — flat capitular bract abruptly attenuated in lower  $\frac{1}{3}$ - $\frac{1}{2}$  (*A. conocephalus*, Ising 1529). e — flat capitular bract with wing-like extension (*A. preissianus*, Short 716). f — flat capitular bract with horn-like basal appendages (*A. cornutus*, Chinnock 4692). g — pappus of *A. acrohyalinus* (Short 484). h — pappus of *A. tomentosus* (Short 1075). i — pappus of *A. conocephalus* (Ising 1529). j — pappus of *A. brachypappus* (Bruchner MEL 84877). k — pappus of *A. micropodioides* (Short 613).

hairy. *Compound heads* ellipsoid or ovoid, 0.8-2.5(2.8) cm long, 0.7-1.1 cm diam.; bracts subtending compound heads not forming a conspicuous involucre but several to c. 10, leaf-like hairy bracts with hyaline apices present, grading into capitulum-subtending bracts; *general receptacle* cylindrical to narrowly oblong. *Capitula* 300-1,000 (c. 1,500) per compound head; capitulum-subtending bracts 1(2, ?3), if more than one then extra one(s) abaxial to, and overlapping, the inner, all bracts narrowly elliptic or obovate, sometimes  $\pm$  oblanceolate, 2.2-3.5(3.9) mm long, 0.6-1(1.2) mm wide, the midrib glabrous or variably hairy toward the apex and often some glandular hairs present. *Capitular bracts* with the two concave ones 2.3-3.6(3.9) mm long, the midrib glabrous or sparsely hairy toward the apex and sometimes with some glandular hairs; flat bracts 2, oblanceolate to obovate,  $\pm$  gradually tapering toward the base, 2.3-3.5(3.75) mm long, 0.6-0.8 mm wide, the midrib usually glabrous but a few glandular hairs sometimes present. *Florets* 2; corolla 5-lobed, the tube tapering  $\pm$  gradually to a variably swollen base, 1.65-2.7(3.2) mm long, c. 0.2-0.3 mm diam. *Achenes*  $\pm$  obovoid or ovoid, 0.45-0.85 mm long, c. 0.2 mm diam., papillose. Pappus of 4-6 bristles c. the length of the corolla tube, barbellate in the lower  $\frac{1}{2}$ , sub-plumose in the upper  $\frac{1}{2}$ , united into a small slightly toothed ring at the base. Fig. 3g.

#### DISTRIBUTION (Fig. 2):

North-west Western Australia between latitudes 22°S and 27°S and west of longitude 118°E. Common.

#### ECOLOGY:

Commonly associated with chenopod dominants in clay soils but also grows in loam or red sand. Collectors' notes include "On red *Triodia* sand-hills", "Reddish loam, with limestone rock. Chenopod, *Acacia* dominants" and "Saline depression . . . growing amongst *Arthrocnemum* [= *Halosarcia*] on powdery white-brown clay loam".

#### NOTE:

1. *A. acrohyalinus* has obvious affinities with *A. tomentosus* and *A. milnei* and the 3 species all occur in the north-west of Western Australia. However the flexuose axes, conduplicate leaves and the sub-plumose to plumose pappus bristles distinguish *A. acrohyalinus* from all other species.

#### SELECTED SPECIMENS EXAMINED (8/15):

*Western Australia* — *Barnett s.n.*, Carnarvon, s. dat. (PERTH); *Beard* 2974, Onslow, 23.viii.1963 (PERTH); *Chadwick* 1473, Cape Range, s. dat. (PERTH, UWA); *Demarz* 2468, Hamersley Station, 19.viii.1970 (PERTH); *Short* 435, 57 km from Denham along Overlander Roadhouse road, 21.viii.1977 (AD); *Short* 444, c. 43 km N. of Overlander Roadhouse, 21.viii.1977 (AD); *Short* 483, c. 3 km N. of Lyndon River on Minilya-Cape Range road, 27.viii.1977 (AD); *Short* 1000, c. 19.3 km SE. of Nanga, 17.xi.1979 (AD).

2. ***Angianthus milnei*** Benth., Fl. Austr. 3:564 (1867). — *Styloncerus milnei* (Benth.) Kuntze, Rev. Generum Pl. 367 (1891). TYPE: "Shark's Bay and Dirk Hartog's Island, abundant, Milne." LECTOTYPE (here designated): *Milne s.n.*, Shark Bay, New Holland, planis, s. dat. (K). ISOLECTOTYPE: PERTH (fragments only). SYNTYPE: *Milne s.n.*, Dirk Hartog Island, planis, plentiful, s. dat. (K, mounted with lectotype).

*Annual herb*, 6-25(26) cm high. Major axes erect or ascending, hairy; stem often simple in the smaller plants, to c. 10 cm high, but usually forming major branches at basal and/or upper nodes. *Leaves* alternate, narrowly elliptic, lanceolate or oblanceolate, 1-6.5(7.2) cm long, 0.1-0.4(0.9) cm wide, sometimes slightly mucronate, the uppermost ones with a hyaline appendage at the apex, all leaves hairy. *Compound heads* narrowly ellipsoid to ellipsoid, 0.5-2(2.2) cm long, 0.5-0.9 cm diam.; bracts subtending compound heads not forming a conspicuous involucre but several leaf-like, hairy bracts with hyaline apices present, grading into capitulum-subtending bracts; *general receptacle* cylindrical to narrowly oblong. *Capitula* c. 100-400 per compound head; capitulum-subtending bracts 1,  $\pm$  elliptic, obovate or ovate, 2.7-3.6 mm long, 0.7-1.2 mm wide, the lamina with a prominent constriction in the upper part, the midrib  $\pm$  densely hairy toward the apex, the simple hairs with a length up to c. 1-1.5 times the width of the bract, glandular hairs sometimes present. *Capitular bracts* with the two concave ones 2.4-3.4 mm long,

the midrib sparsely hairy toward the apex and sometimes with a few glandular hairs; flat bracts 2,  $\pm$  oblanceolate, obovate or narrowly elliptic, gradually tapering toward the base, 2.3-3.5 mm long, 0.6-1.1 mm wide, the midrib usually sparsely hairy toward the apex, glandular hairs sometimes present. *Florets* 2; corolla 5-lobed, the tube tapering gradually into a variably swollen base, sometimes a  $\pm$  abrupt taper in the lower  $\frac{1}{2}$ , 1.7-2.3 mm long, 0.3-0.5 mm diam. *Achenes* obovoid, 0.6-0.9 mm long, c. 0.3 mm diam., papillose. *Pappus* absent.

Chromosome number:  $n = 13$  (Turner, 1970 — as '*A. tomentosus*', T5382). Fig. 3.

#### DISTRIBUTION (Fig. 2):

North-west Western Australia between latitudes 21°S and 28°S and west of longitude c.119°E. Common.

#### ECOLOGY:

Occurs on the margins of saline depressions or in open scrubland, shrubland or tussock grassland formations. Collectors' notes include "Wattle scrub on stony plateau", "In red sand on Spinifex plain" and "Reddish loam, with limestone rock. Chenopod, *Acacia* dominants".

#### NOTES:

1. *A. milnei* in many respects resembles *A. tomentosus* and *A. acrohyalinus* and commonly grows with the latter. However it is readily distinguished from them by the absence of a pappus and by the presence of the distinctive lamina and hairs on the midrib of the capitulum-subtending bract. The conduplicate leaves of *A. acrohyalinus* are distinctly different from those of *A. milnei*.

2. Collections from the Cliff Head-Jurien Bay region (see list below) lack the distinctive lamina and long hairs on the capitulum-subtending bracts and at least one collection, *Burns* 128, contains some florets with a small, jagged, ring-like pappus. Their distribution falls outside that of typical *A. milnei* and collection data suggest that the populations tend to grow in saline regions. It appears that the collections represent a distinct taxon, possibly a subspecies of *A. milnei*. More collections should be examined before any formal status, if any, is conferred upon this taxon.

#### SELECTED SPECIMENS EXAMINED (8/20):

Western Australia — *Beard* 6020, 10 miles W. of Gascoyne Junction, 18.viii.1970 (NSW, PERTH); *Demarz* 4689, Lake Austin, 23.x.1973 (KP, PERTH); *Gardner* 6007, No. 2 tank between Geraldton and Shark Bay, 17.ix.1941 (PERTH); *Gardner* 7836, Tuckanarra, 13.x.1945 (PERTH); *George* 1125, 20 miles E. of Onslow, 27.viii.1960 (PERTH); *Short* 483A, c. 3 km N. of Lyndon River on Minilya-Cape Range road, 27.viii.1977 (AD); *Speck* 678, 15 miles E. of Berrigarra, 6.ix.1957 (CANB, PERTH); *Turner* 5382, 50 miles SE. of Gascoyne Junction, 22.viii.1965 (PERTH).

#### SPECIMENS EXAMINED, *A. milnei* VARIANT

Western Australia — *Burns* 128, Cliff Head, S. of Dongarra, 25.x.1967 (PERTH); *Keighery* 578, 3 km E. of Jurien Bay, 20.x.1975 (KP); *Paust* 1158, 3.2 km NE. of Jurien Bay, 3.x.1972 (PERTH); *Short* 1012, c. 2.1 km from Jurien Bay, 19.xi.1979 (AD).

#### 3. *Angianthus cyathifer* Short, sp. nov.

[*Angianthus tomentosus* auct. non Wendl.: Chippendale, Trans. Roy. Soc. S. Aust. 84:103 (1961).]

*Herba annua*. Axes maiores plerumque ascendentes decumbentesve, raro erecti, (4)8-18(24) cm longi, varie pilosi; caulis plerumque ramis maioribus vix clarus. *Folia* alterna, sublinearia vel elliptica vel ita anguste, (0.3)0.5-2.5 cm longa, c. 0.1 cm lata, pilosa interdum paulum mucronata, mucrone foliorum superiorum hyalino. *Glomeruli* ellipsoidei vel ita subanguste, 1.2-2.5(2.9) cm longi, c. 0.5 cm diametro; bractee glomerulos subtendentes paulum clare; receptaculum cylindraceum usque subanguste oblongum. *Capitula* c. 100-500; bractee capitulum subtendentes 1(2-3),  $\pm$  ellipticae, obovatae vel  $\pm$  oblongae, (1.7)2.1-2.7 mm longae, 0.8-1.3 mm latae; costa plerumque pilosa, interdum pilos glandulosos ferens. *Bractee intra capitulum*: duo concave (1.7)2-2.7 mm longae, costa ad apicem pilosa, interdum pilos glandulosos ferenti; duo planae anguste ellipticae usque ellipticae obovatae, (1.65)2.2-2.6 mm longae, 0.6-1 mm latae, gradatim attenuatae, costa plerumque glabra, interdum pilos glandulosos ferenti. *Flosculi* 2; corolla 5-lobata. *Achenia* subobovoidea, 0.5-0.75 mm longa, c. 0.2-0.3 mm diametro, papillosa. *Pappus* subcyathiformis, laceratus saepe 2-4 squamis claris ad basem coniunctis similis, 0.2-0.55 mm longus.

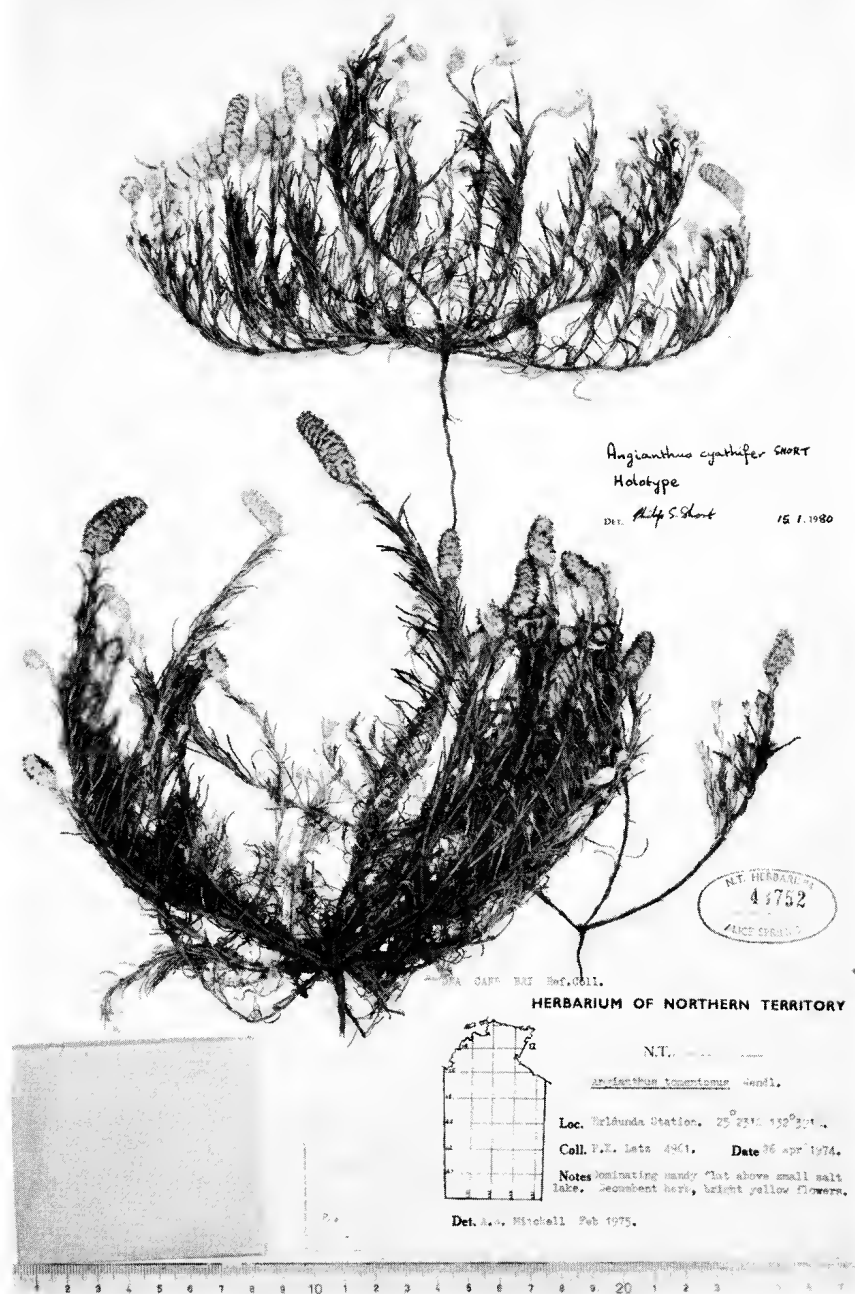


Fig. 4. *A. cyathifer* Short. Holotype (Latz 4961, NT).

**HOLOTYPE** (fig. 4): Latz 4961, Erldunda Station, 25°23'S, 132°39'E. Dominating sandy flat above small salt lake. Decumbent herb, bright yellow flowers, 26.iv.1974 (NT 43752). **ISOTYPUS**: BRI 013705 (NT label indicates that further duplicates occur in CANB, DNA & NT reference colln.).

*Annual herb.* Major axes usually ascending or decumbent, rarely erect, (4)8-18(24) cm long, hairy; stem usually not distinguishable from major branches. *Leaves* alternate,  $\pm$  linear or  $\pm$  narrowly elliptic to elliptic, (0.3)0.5-2.5 cm long, c. 0.1 cm wide, sometimes slightly mucronate, the upper most ones with a hyaline appendage at the apex, all leaves hairy. *Compound heads*  $\pm$  narrowly ellipsoid to ellipsoid, 1.2-2.5(2.9) cm long, c. 0.5 cm diam.; bracts subtending compound heads not forming a conspicuous involucre but several leaf-like bracts with hyaline apices present, grading into capitulum-subtending bracts; *general receptacle* cylindrical to  $\pm$  narrowly oblong. *Capitula* c. 100-500 per compound head; capitulum-subtending bracts 1(2, ?3), if more than one then the extra one(s) abaxial to, and overlapping, the inner, all bracts  $\pm$  elliptic, obovate or  $\pm$  oblong, (1.7)2.1-2.7 mm long, 0.8-1.3 mm wide, the midrib usually hairy and glandular hairs sometimes present. *Capitular bracts* with the two concave ones (1.7)2-2.7 mm long, the midrib hairy toward the apex and glandular hairs sometimes present; flat bracts 2, gradually tapering to the base, narrowly elliptic to elliptic or obovate, (1.65)2.2-2.6 mm long, 0.6-1 mm wide, the midrib usually glabrous, sometimes glandular hairs present. *Florets* 2; corolla 5-lobed, the tube tapering gradually to the base, (1)1.4-1.9 mm long, c. 0.5 mm diam., a few glandular hairs sometimes present on the tube. *Achenes*  $\pm$  obovoid, 0.5-0.75 mm long, c. 0.2-0.3 mm diam., papillose. *Pappus*  $\pm$  cup-shaped, jagged, often appearing as 2-4  $\pm$  distinct scales united at the base, 0.2-0.55 mm long. Fig. 4.

#### DISTRIBUTION (Fig. 2):

South-west corner of the Northern Territory and central Western Australia. Moderately common.

There is a marked disjunction in distribution between the Western Australian collections and those from the Northern Territory but all specimens appear to represent a single taxon. Further collections are required to substantiate this view.

#### ECOLOGY:

Grows in sandy or clay soils which surround saline depressions. Collectors' notes include "Saltpan area encroached by sand, populated by various annuals, perennial grasses and samphires", "... on margins of salt pan with *Arthrocnemum* [= *Halosarcia*] spp. in deep, white saline sand" and "clayish soil around salt lake".

#### NOTES:

1. The specific epithet alludes to the cup-like pappus.

2. This species has close affinities with *A. tomentosus*. It is readily distinguished by its pappus and the usually ascending or decumbent major axes.

#### SPECIMENS EXAMINED:

*Western Australia* — *Speck* 1429, 10 miles W. of Yelma, 12.ix.1958 (AD, CANB, PERTH); *Tölken* 6089, Lake Miranda, 11.ix.1979 (AD, PERTH); *Wilson* 7490, 30 km NE. of Nambi homestead, 29.viii.1968 (PERTH).

*Northern Territory* — *Beaglehole* 50933, Tanami Desert, 27 km NW. of the Granites, 20.v.1976 (ACB); *Dunlop* 1816, 77 miles WSW. Granites, 2.vii.1970 (NT); *Latz* 4083, Salt Beef Lake, Tanami Sanctuary, 22.vii.1973 (NT, PERTH); *Latz* 4248, Lake Neale, 28.viii.1973 (NT); *Latz* 6547, south of Mongrel Downs, 4.viii.1976 (MEL); *Lazarides* 6088, 30 miles SSW. of Napperby Station, 28.ix.1956 (AD, BRI, CANB, NSW, NT); *Maconochie* 1790, 3 miles SE. Sangster's Bore, 22.vii.1973 (NT).

#### 4. *Angianthus glabratus* Short, sp. nov.

*Herba annua*, 6-14(16) cm alta. Axes maiores erecti ascendentesve, glabri parum pilosi; caulis e nodis basalibus superioribusque, ramos maiores efficiens. *Folia* alterna, in vivo sucosa teretia, 0.4-1.6(3) cm longa, c. 0.1 cm lata, mucronem carentia sed interdum folius superioribus ad apicem appendicem hyalinam ferentia, subglabra. *Glomeruli* ellipsoidei vel ita anguste, 1-2.5(3.4) cm longi, 0.4-0.6 cm diametro; bractee glomerulos subtendentes parum clare; receptaculum anguste oblongum. *Capitula* c. 100-500; bractee capitulum subtendentes 1(2-?3), ovatae suboblongaeve, 1.8-2.5 mm longae, 1-1.6 mm latae; costa glabra vel ad apicem varie pilosa. *Bractee intra capitulum*: duo concave 1.6-2.3 mm longae, costa glabra vel ad apicem varie pilosa; duo planae, subellipticae obovatae, 1.6-2.2 mm longae, 0.7-1.2 mm latae, attenuatae, costa glabra vel ad apicem varie pilosa. *Flosculi* 2; corolla 5-lobata. *Achenia* subovoidea, c. 0.5-0.8 mm longa, c. 0.3 mm diametro, papillosa. *Pappus* cyathiformis, varie laceratus, interdum c. 5 squamis ad basem coniunctis similis, 0.2-0.4 mm longus.



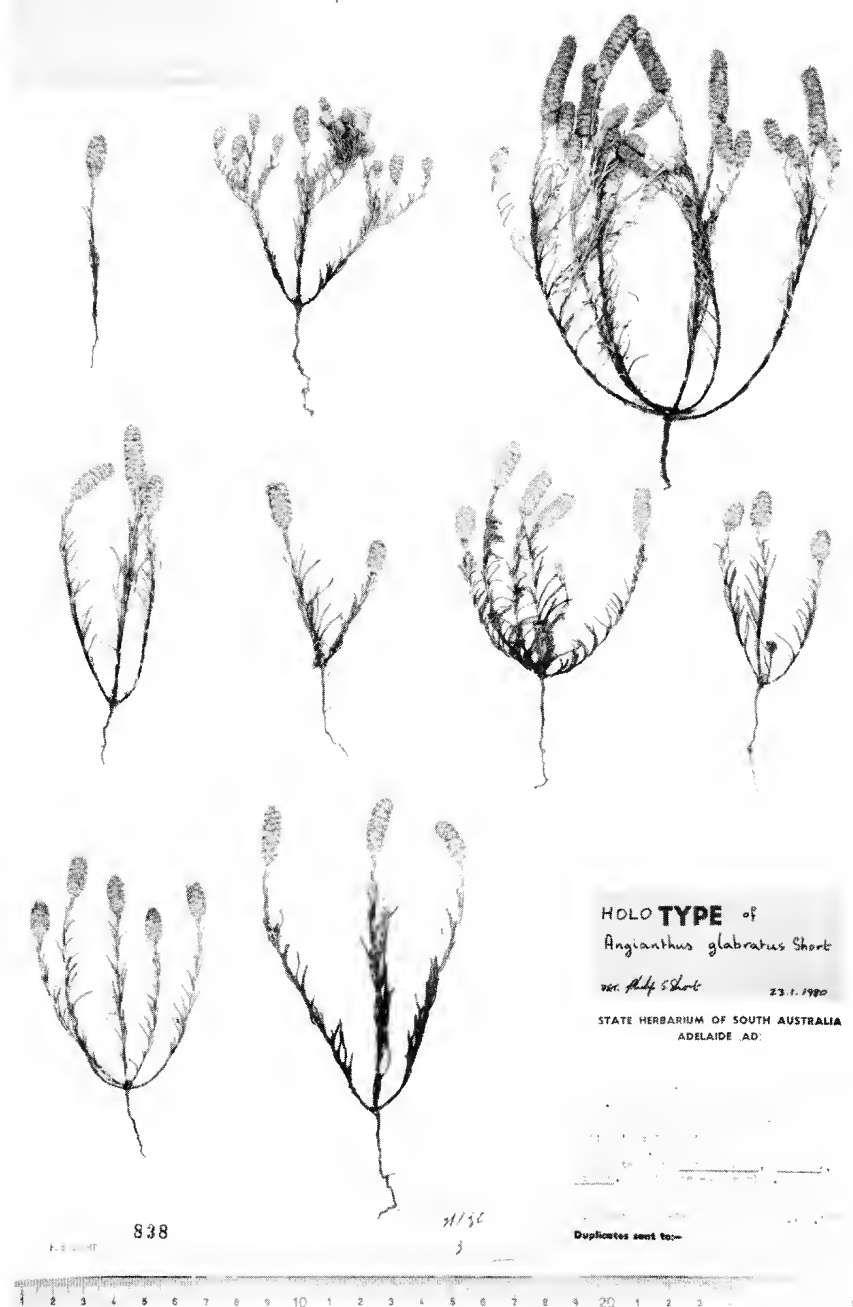


Fig. 5. *A. glabratus* Short. Holotype (Short 838, AD).

HOLOTYPUS (fig. 5): Short 838, c. 5.8 km west of Nectar Brook Station along road to Chinamans Creek (34°42'S, 137°54'E). Associated with *Arthrocnemum* [= *Halosarcia*], *Atriplex*, *Aizoon*. Salty grey-white clay. Very common. 9.xii.1978 (AD). ISOTYPUS: CANB, K, MEL, PERTH.

*Annual herb*, 6-14(16) cm high. Major axes erect or ascending, glabrous or slightly hairy; stem simple or forming major branches at basal and/or upper nodes. *Leaves* alternate, succulent and cylindrical when fresh, 0.4-1.6(3) cm long, c. 0.1 cm wide, not mucronate but sometimes the upper ones with a hyaline appendage at the apex, all leaves  $\pm$  glabrous. *Compound heads* narrowly ellipsoid to ellipsoid, 1-2.5(3.4) cm long, 0.4-0.6 cm diam.; bracts subtending compound heads not forming a conspicuous involucre but several leaf-like, hairy bracts with hyaline apices present, grading into capitulum-subtending bracts; *general receptacle* cylindrical to narrowly oblong. *Capitula* c. 100-500 per compound head; capitulum-subtending bracts 1(2, ?3), if more than one then the extra one(s) abaxial to and overlapping the inner, all bracts ovate or  $\pm$  oblong, 1.8-2.5 mm long, 1-1.6 mm wide, the midrib glabrous or variably hairy toward the apex. *Capitular bracts* with the two concave ones 1.6-2.3 mm long, the midrib glabrous or variably hairy toward the apex; flat bracts 2,  $\pm$  elliptic or obovate, gradually tapering towards the base, 1.6-2.2 mm long, 0.7-1.2 mm wide, the midrib glabrous or variably hairy toward the apex. *Floret* 2; corolla 5-lobed, the tube tapering  $\pm$  gradually to the base, 1.1-1.5 mm long, c. 0.4 mm diam. *Achenes*  $\pm$  obovoid, c. 0.5-0.8 mm long, c. 0.3 mm diam., papillose. *Pappus* cup-shaped, variably jagged, sometimes appearing to be composed of c. 5 scales joined at the base, 0.2-0.4 mm high. Figs.: 3a, c; 5.

#### DISTRIBUTION (Fig. 2):

Upper Eyre Peninsula, South Australia between latitudes 31°S and 33°S and longitudes 135°E and 138°E. Moderately common.

#### ECOLOGY:

Commonly grows on the margins of saline depressions where usually associated with species of *Halosarcia*, *Atriplex* and *Aizoon*, but also occurs on coastal sand-dunes. Also recorded in an *Acacia linophylla* association on red sand dunes.

#### NOTES:

1. The specific epithet refers to the more or less glabrous nature of the species. This characteristic readily distinguishes it from perhaps its closest relatives, *A. brachypappus* and *A. tomentosus*.

#### SELECTED SPECIMENS EXAMINED (6/14):

*South Australia* — Chinnock 2618, 30 km W. of Kingoonya on the Tarcoola road, 27.ix.1975 (AD); Eichler 18817, SW. end of Pernatty Lagoon, 22.x.1966 (AD); Higginson s.n., Port Augusta, 1955 (ACB); Lay 547, Kenella Rocks, Wilgena Station, 1.x.1971 (AD); Short 793, c. 26.7 km S. of Hiltaba homestead, 25.ix.1978 (AD); Specht & Carrodus 96, 40 miles N. of Nonning homestead, 16.xi.1958 (AD).

5. *Angianthus tomentosus* Wendl., Collect. Pl. 2:32; t.48 (?1808); Brown, Trans. Linn. Soc. London 12:103 (1817); Cass., Dict. Sci. Nat. 14:483 (1819); DC., Prod. 6:150 (1838); Sond., Linnaea 25:487 (1853); Benth., Fl. Austr. 3:562 (1867); J. M. Black, Fl. S. Aust. 1st ed. 644 (1926), 2nd ed. 924 (1957); Willis, Handb. Pl. Vict. 2:729 (1973); Grieve & Blackall, W. Aust. Wildfls 811 (1975). — *Stylancerus tomentosus* (Wendl.) Kuntze, Rev. Generum Pl. 367 (1891). — *Siloxerus tomentosus* (Wendl.) Ostenf., Biol. Meddel. Kongel. Danske Vidensk. Selsk. 3:137 (1921). TYPE: "Botany Bay". LECTOTYPE (here designated): GOET (ex herb. Wendl., Herrenhausen; photograph only seen). PROBABLE ISOLECTOTYPES: GOET (ex herb. Bartling; photograph only seen), MEL 543905 (ex herb. Steetz), (see note 2 below).

*Cassinia aurea* R. Br. in W. T. Aiton, Hort. Kewensis 2nd ed. 5:184 (1813); Spreng., Syst. Veg. 16th ed. 426 (1826). TYPE: "Nat. of the South coast of New Holland. Robert Brown, Esq. Introd. 1803, by Mr. Peter Good". TYPE SPECIMEN: *Brown s.n.*, Bay IV, South Coast, s. dat. (K), (see note 3 below).

*Cylindrosorus flavescens* Benth., Enum. Pl. Hueg. 62 (1837). — *Angianthus flavescens* (Benth.) Steetz in Lehm., Pl. Preiss. 1:438 (1845). TYPE: "Swan River (Hugel)". LECTOTYPE (here designated): *Hugel s.n.*, Swan River, s. dat. (K, herb. Benth.). ISOLECTOTYPE: W. Probable isoelectotype: MEL 84773 (see note 4 below).

*Annual herb*, (3)5-30(44.5) cm high. Major axes erect or ascending, hairy; stem often simple in the smaller plants, to c. 10(19) cm high, but usually forming major branches at basal and/or upper nodes. *Leaves* alternate, oblanceolate or sometimes a few narrowly elliptic, 0.5-3(5.1) cm long, 0.1-0.3(0.5) cm wide, sometimes slightly mucronate, the upper ones with a small hyaline appendage present at the apex, all leaves hairy. *Compound heads* ellipsoid or lanceoloid to ovoid, 0.7-3(5.3) cm long, 0.4-0.8(1.1) cm in diam.; bracts subtending compound heads not forming a conspicuous involucre but several leaf-like, hairy bracts with hyaline apices present, grading into capitulum-subtending bracts; *general receptacle*  $\pm$  cylindrical to narrowly oblong. *Capitula* 150-700(1,000) per compound head; capitulum-subtending bracts 1(2-4), if more than one then the extra one(s) abaxial to, and overlapping, the inner, all usually ovate, sometimes  $\pm$  lanceolate, elliptic or  $\pm$  obovate, (2.1)2.3-3(3.3) mm long, 0.7-1(1.45) mm wide, the midrib glabrous or variably hairy toward the apex and sometimes with a few glandular hairs. *Capitular bracts* with the two concave ones (1.8)2.1-2.7(3) mm long, the midrib usually glabrous but sometimes a few glandular hairs present; flat bracts 2,  $\pm$  obovate, gradually tapering to the base, rarely a more or less abrupt taper in the lower  $\frac{1}{2}$ , (1.8)2.1-2.8(3) mm long, 0.6-1(1.2) mm wide, the midrib usually glabrous but sometimes a few glandular hairs present. *Florets* 2; corolla 5-lobed, the tube tapering gradually to the base or sometimes an abrupt taper in the lower  $\frac{1}{2}$ , (1.2)1.3-2(2.2) mm long, c. 0.35-0.4 mm in diam. *Achenes* obconical, 0.5-0.8 mm long, c. 0.3 mm in diam., papillose. *Pappus* of 2-3 jagged scales, 0.25-0.7(0.8) mm long, each scale terminating in 1-2 terminally sub-plumose bristles extending to c. the length of the corolla tube, the total pappus length (1.25)1.35-1.8(2) mm.

Figs: 1j, 3h.

Chromosome number:  $n=12$  (Turner, 1970, T5565).

#### DISTRIBUTION (Fig. 2):

South west of New South Wales, western Victoria, South Australia and below latitude c. 26°S in Western Australia. Very common.

#### ECOLOGY:

Found in both coastal and inland situations around clay pans, saline depressions and granite outcrops or in woodland, scrub and shrubland formations. Collectors' notes include "Red soil near granite outcrop. Assoc. with *Waitzia* sp. & *Sida calyxhymenia*.", "Claypan depression with *Casuarina cristata*, *Heterodendrum* and *Atriplex vesicaria*.", "In *Kochia pyramidata* [= *Maireana pyramidata*] association", "On sandy loam with *Melaleuca* and *Atriplex* on edge of salty flat", "Clay loam in mallee *Eucalyptus*, *Melaleuca*, *Casuarina* scrubland" and "*Eucalyptus* woodland with *Eremophila* spp. & *Cratystylus* as dominant shrubs. Brown clay loam."

#### NOTES:

1. The publication date of volume 2 of Wendland's *Collectio Plantarum* is usually cited as 1810. Stafleu (1967) has suggested that pages 16-34 and plates 43-48, which include the description of *A. tomentosus*, were published in 1808.

2. The type locality of *A. tomentosus* is cited by Wendland (?1808) as Botany Bay. However the species does not occur in eastern New South Wales. Brown (1817) and Cassini (1819) were both of the opinion that Wendland described it from material acquired from Kew. This material presumably originated from that collected by Brown and/or Good from Petrel Cove (see note 3 below).

Wendland's reference to Botany Bay as the collection site is possibly due to the fact that many of the Australian plants collected by Good and cultivated at Kew were kept in a glasshouse referred to as the "Botany Bay House" (Smith, 1881).

Wendland presumably based his description of *A. tomentosus* on all material available to him. Of the two collections held at GOET the one selected as the lectotype comes from Wendland's own herbarium in Herrenhausen while the other is a collection originally sent by Wendland to the German botanist Bartling in 1842 (Prof. Dr G. Wagenitz, pers. comm., 1981). The MEL collection, which consists of cultivated material, was presented to J. Steetz by Wendland's son in 1844. This information was recorded by Steetz on the herbarium sheet.

3. The only type material of *C. aurea* seen is housed at K. It is clearly marked "Bay IV, South Coast" which indicates that it was collected from Petrel Bay, Isle St. Francis (Stearn, 1962).

4. Bentham (1837) based his description of *Cylindrosorus flavescens* on a collection made by Hügel in Western Australia. According to Stafleu (1967) the Hügel collections were acquired by the Vienna herbarium (W) in 1839. However a specimen was obtained from Vienna by Bentham and is now housed at K (Bentham, 1863). It follows therefore that one should lectotypify. Both the K and W specimens are well preserved and there seems no reason to give preference to either other than that Bentham presumably chose to retain the specimen at K.

The sheet MEL 84773 contains a single specimen designated as *C. flavescens*. It comes from O. W. Sonder's collection but the label indicates that it originally came from Vienna. Although there is no indication that the specimen was collected by Hügel it is nevertheless a good match with the specimens from K and W.

#### SELECTED SPECIMENS EXAMINED (19/76):

*Western Australia* — Allan 183, Fitzgerald River, 50 miles W. of Ravensthorpe, 8.xi.1969 (BR1, PERTH); Chinnock 1068, 30 km NE. of Depot Springs homestead, 15.ix.1973 (AD); George 3806, Elder Creek, 21.viii.1962 (PERTH); Kenneally 71/289, 7½ miles W. of Ballidu, 28.ix.1971 (UWA); Short 431, Hamelin Pool, 20.viii.1977 (AD); Short 562, Edge of Mongers Lake, 18.ix.1977 (AD); Short 612, Mt Rupert Station, 20.ix.1977 (AD); Short 620, Hines Hill, 21.ix.1977 (AD); Short 704, Newman Rocks, 29.ix.1977 (AD); Vachell s.n., Kellerberin, -xii.1903 (NSW 138779).

*South Australia* — Crisp 682, Koonamore Station, 8.xii.1973 (AD, CBG); Lang 994, c. 14.7 km SE. of Hiltaba homestead, 14.x.1977 (AD); Short 708, c. 14.7 km W. of Yalata Mission turn-off on main highway to Perth, 29.viii.1977 (AD); Specht & Carrodus 23, 10 miles N. of Nonning homestead, 14.xi.1958 (AD); Wace 12, Masillon Island, 5.i.1971 (AD).

*Victoria* — D'Alton s.n., Dimboola, 1901 (NSW 138781); Henshall s.n., Red Cliffs, 21.xi.1968 (NT).

*New South Wales* — Alchin 332, Wentworth, 28.x.1975 (NSW); Green 182, Pooncarie, -x.1974 (NSW).

6. **Angianthus brachypappus** F. Muell., Trans. Philos. Soc. Vict. 1:44 (1855); F. Muell., J. Bot. (Hooker) 8:149 (1856); Benth., Fl. Austr. 3:563 (1867); F. M. Bail., Qd. Fl. 848 (1900); J. M. Black, Fl. S. Aust. 1st ed. 644 (1929), 2nd ed. 924 (1957), p.p. (excl. *A. conocephalus* (J. M. Black) Short); Willis, Handb. Pl. Vict. 2:729 (1973). — *Stylancerus brachypappus* (F. Muell.) Kuntze, Rev. Generum Pl. 367 (1891). — *Siloxerus brachypappus* (F. Muell.) Ising, Trans & Proc. Roy. Soc. S. Aust. 46:604 (1922). TYPE: "On barren plains near Swanhill." LECTOTYPE (here designated): ?Mueller s.n., Murray plains near Swanhill, s. dat. (MEL 541214). POSSIBLE ISOLECTOTYPES: GH (ex herb. O. W. Sonder, location given as "Murray"); MEL 541222 (no locality details but descriptive notes in Mueller's hand and specimens resemble those of lectotype); MEL 541212 (ex herb. Sond., resembles lectotype but locality given as "Murray"); MEL 541213 (resembles lectotype but locality given as "Murray").

*Annual herb*, (3)5-13.5 cm high. Major axes erect or ascending, sometimes decumbent, hairy; stem rarely simple, usually forming major branches at basal and upper nodes. *Leaves* alternate, usually oblanceolate, sometimes  $\pm$  linear or narrowly elliptic, 1-3(3.2) cm long, 0.1-0.5 cm wide, usually very slightly mucronate, the upper most ones with a small hyaline appendage at the apex, all leaves variably hairy. *Compound heads* lanceoloid to  $\pm$  ovoid or narrowly ellipsoid to ellipsoid, 1-2.5(2.9) cm long, 0.5-0.8 cm diam.; bracts subtending compound heads usually not forming a conspicuous involucre, rarely c.  $\frac{1}{4}$  the length of the head, usually of c. 5-6(10) leaf-like bracts with hyaline apices present, grading into capitulum-subtending bracts; *general receptacle* cylindrical or narrowly oblong. *Capitula* c. 100-300 per compound head; capitulum-subtending bracts 1(2-3), if more than one then the extra one(s) abaxial to and overlapping the inner, all bracts elliptic or obovate, sometimes  $\pm$  ovate, lamina rarely with a distinct constriction in the upper part, the entire bracts (2)2.3-3(3.25) mm long, 1-1.7(1.9) mm wide, the midrib variably hairy toward the apex. *Capitular* bracts with the 2 concave ones (2.1)2.3-3.2 mm long, the midrib variably hairy toward the apex; flat bracts 2, obovate, abruptly attenuated in the lower  $\frac{1}{3}$ - $\frac{1}{2}$ , the edge of the bracts often incurved so as to slightly cover the florets, (2)2.2-3(3.3) mm long, 0.8-1.3 mm wide, the midrib variably

hairy toward the apex and often with a dissected wing-like extension from the adaxial surface. *Florets* 2; corolla 5-lobed, the tube tapering  $\pm$  gradually to a sometimes variably swollen base, (1.3)1.5-2.2 mm long, c. 0.4 mm diam. *Achenes*  $\pm$  obovoid, 0.5-0.8 mm long, c. 0.3 mm diam., papillose. Pappus cup-shaped, variably jagged, often with 1 or 2 bristles extending  $\frac{1}{2}$ - $\frac{2}{3}$  the length of the corolla tube, the cup 0.15-0.7 mm high, including the bristles the total pappus length up to 1.6 mm long. Fig. 3j.

#### DISTRIBUTION (Fig. 2):

North-eastern South Australia, western New South Wales and north-west Victoria. Common.

Two collections, *Blake 10441* and *White BRI 224128*, from Yelarbon, Queensland, represent a disjunct locality. Unfortunately the condition of the specimens is poor but there appears to be no reason to exclude them from *A. brachypappus*.

#### ECOLOGY:

Commonly occurs on sandy soils in open areas. Collectors' notes include "Open plain, sandy loam", "Sandridge, very common, blue-bush association" and "Very gently undulating gilgaied depressions on brown gibber soils".

#### SELECTED SPECIMENS EXAMINED (8/66):

*South Australia* — *Lay 577*, Balta Baltana Block, 7.x.1971 (AD); *Symon 9478*, W. edge of Simpson Desert, NE. of Macumba, 28.ix.1974 (AD); *Weber 1443*, Andamooka Opal Fields, 8.ix.1968 (AD).

*Victoria* — *Willis s.n.*, C. 1 mile E. of Berribee Tank, 31.viii.1948 (MEL 84413).

*New South Wales* — *Constable s.n.*, Mundi Mundi Station, 14.x.1947 (NSW 4543); *Leigh S30*, 50 miles NE. of Hay, 26.ix.1963 (NSW); *Richley F97*, Fowler's Gap, 20.ix.1973 (AD).

*Queensland* — *Blake 10441*, Yelarbon, 22.ii.1936 (BRI, GH).

#### 7. *Angianthus conocephalus* (J. M. Black) Short, comb. et stat. nov.

*Angianthus brachypappus* var. *conocephalus* J. M. Black, Fl. S. Aust. 1st ed. 645, fig. 300 (1929), 2nd ed. 924, fig. 1224 (1957), basionym. TYPE: "Ooldea; Nullarbor Plain." LECTOTYPE (here designated): ? *J. M. Black s.n.*, Ooldea, 25.ix.1920 (AD 97823002, herb. J. M. Black). SYNTYPE (POSSIBLE ISOLECTOTYPE): *J. M. Black s.n.*, Ooldea, 25.ix.1920 (AD 98103149, herb. J. M. Black). OTHER SYNTYPES: *J. M. Black s.n.*, Ooldea, 24.ix.1920 (AD 98103149, herb. J. M. Black); *J. M. Black s.n.*, Ooldea, growing on edge of Nullarbor Plain, 24.ix.1920 (AD 98103149, herb. J. M. Black); *J. M. Black s.n.*, Ooldea, just W. of siding & near rlyne, 23.ix.1920 (AD 98103149, herb. J. M. Black); *Ising s.n.*, Nullarbor Plain, s. dat (AD 98103149), herb. J. M. Black).

[*Angianthus brachypappus* auct. non. F. Muell.: Grieve & Blackall, W. Aust. Wildfls 812 (1975).]

*Annual herb*. Major axes usually ascending or decumbent, rarely erect, 3-8 cm long, hairy; stem usually not distinct from the major branches which develop from basal nodes. *Leaves* alternate,  $\pm$  linear, rarely oblanceolate, 0.5-1.5(1.7) cm long, c. 0.1 mm wide, nor or very slightly mucronate, the upper most ones with a small hyaline appendage at the apex, all leaves variably hairy. *Compound heads*  $\pm$  ovoid, 0.8-1.6 cm long, 0.4-0.6 cm diam.; bracts subtending compound heads not forming a conspicuous involucre but usually several leaf-like, hairy bracts with hyaline apices present, grading into capitulum-subtending bracts; *general receptacle* narrowly oblong, the capitula arranged in a spike-like fashion, the minor receptacular appendages small. *Capitula* c. 30-100 per compound head; capitulum-subtending bracts 1(2-4), if more than one then the extra one(s) abaxial to, and overlapping the inner, all bracts obovate, 2.3-2.8 mm long, 0.8-1.2 mm wide, the midrib glabrous or sparsely hairy toward the apex. *Capitular bracts* with the 2 concave ones 2.3-2.7 mm long, the midrib glabrous; flat bracts 2, obovate, abruptly attenuated in the lower  $\frac{1}{3}$ , the edge of the bracts incurved so as to slightly cover the florets, 2-2.7 mm long, 0.9-1.4 mm wide, the midrib glabrous or sparsely hairy toward the apex. *Florets* 2; corolla 5-lobed, the tube tapering gradually to the base, 1.4-2.1 mm long, c. 0.4 mm diam. *Achenes*  $\pm$  obovoid, 0.4-0.7 mm long, c. 0.3 mm diam., papillose. Pappus a jagged ring, 0.1-0.3 mm long. Figs: 3d, i.

## DISTRIBUTION (Fig. 2):

Nullarbor Plain region. Common.

## ECOLOGY:

Occurs on both clay and loam soils. Collectors' notes include "Common on clayey soils", "Fine sandy loam over calcrete" and "In loam over limestone".

## NOTE:

1. *A. conocephalus* was originally described by Black (1929) as a variety of *A. brachypappus*. The var. *conocephalus* was considered to have a conical compound head and var. *brachypappus* a cylindrical head. However the shape of the compound head is quite variable. On the other hand both species exhibit distinct differences in habit and leaf morphology and usually pappus morphology. They are also allopatric.

## SELECTED SPECIMENS EXAMINED (5/23):

Western Australia — *Aplin* 1656, Forrest, 31.viii.1962 (PERTH); *Chinnock* 1151, 30 km S. of Rawlinna, 19.ix.1973 (AD); *George* 8495, 30 miles NW. of Reid, 14.x.1966 (PERTH).

South Australia — *Chinnock* 1183, 15 km E. of Koonalda homestead, 21.ix.1973 (AD); *Ising* 1529, Hughes, 8.ix.1920 (AD).

8. ***Angianthus micropodioides*** (Benth.) Benth., Fl. Austr. 3:565 (1867) ('*micropoides*'); Grieve & Blackall, W. Aust. Wildfls 812 (1975) ('*micropoides*'). — *Phyllocalymma micropodioides* Benth., Enum. Pl. Hueg. 62 (1837); Steetz in Lehm. Pl. Preiss. 1:436 (1845). — *Styloncerus micropodioides* (Benth.) Kuntze, Rev. Generum Pl. 367 (1891) ('*micropodes*'). TYPE: "Swan River. (Hügel.)." LECTOTYPE (here designated): *Hügel* s.n., Swan River, s. dat. (W). ISOLECTOTYPE: K (see note 1 below).

*Phyllocalymma filaginoides* Steetz in Lehm. Pl. Preiss. 1:437 (1845); Steetz in Walper's Repert. Bot. Syst. 6:229 (1846). — *Angianthus micropodioides* var. *filaginoides* Ewart & J. White, Proc. Roy. Soc. Vict. 22:92 (1909) ('*micropoides*'). TYPE: "In solo arenoso — turfoso inter frutices ad fluvii Cygnorum ripam prope oppidulum Perth, mense Januario 1839. Herb. Preiss. No. 37." LECTOTYPE (here designated): *Preiss* 37, In Nova Hollandia, (Swan-River Colonia) in solo arenoso turfoso inter frutices ad flumini Cygnorum ripam leg. cl. Preiss, s. dat. (MEL 541603). ISOLECTOTYPES: LD, MEL 541604, MEL 541605 (ex herb. O. W. Sonder), MEL 583143 (ex herb. O. W. Sonder), S, GH (ex herb. Klatt), (see p.152).

*Annual herb*. Major axes ascending to erect, 4-15 cm long, hairy; stem sometimes simple to c. 10 cm high, but usually forming major branches at basal and/or upper nodes. *Leaves* alternate,  $\pm$  linear or lanceolate, 0.5-1.5(2.8) cm long, 0.05-0.1 cm wide, distinctly mucronate, variably hairy. *Compound heads*  $\pm$  depressed ovoid to broadly depressed ovoid, 0.4-0.6 cm long, 0.4-0.5 cm diam., axillary or terminal; bracts subtending compound heads forming a conspicuous involucre exceeding the length of the head, of c. 10 leaf-like bracts,  $\pm$  lanceolate to  $\pm$  ovoid, 0.5-1.5 cm long, c. 0.1 cm wide, mucronate, hairy; *general receptacle* a small convex axis. *Capitula* c. 10-30 per compound head; capitulum-subtending bracts 1,  $\pm$  oblong or ovate, 2.1-2.8 mm long, 0.8-1.3(1.5) mm wide, the midrib variably hairy toward the apex. *Capitular bracts* with the two concave ones 2.4-3.1 mm long, the midrib hairy; flat bracts 2, obovate,  $\pm$  abruptly attenuated in the lower  $\frac{1}{2}$ , 2.4-3.1 mm long, (0.75)0.9-1.25 mm wide, the midrib usually variably hairy toward the apex, rarely glabrous. *Florets* 2; corolla 5-lobed, the tube tapering gradually towards the base in immature florets, a more abrupt taper in the lower  $\frac{1}{3}$  of mature florets which have variably swollen bases, 1.4-1.9 mm long, c. 0.5 mm diam. *Achenes*  $\pm$  obovoid, 0.8-1 mm long, 0.5-0.6 mm diam., pubescent. Pappus of 5 or 6 jagged scales fused at the base, each scale terminating in a single smooth or minutely barbellate bristle, the total pappus c.  $\frac{1}{3}$ - $\frac{2}{3}$  the length of the corolla tube. Fig. 3k.

## DISTRIBUTION (Fig. 2):

Western Australia, particularly in the South West Drainage Division (Mulcahy & Bettenay, 1972), between latitudes c.28°30'S and 32°S and west of longitude c.122°E. Locally common.

## ECOLOGY:

Grows on sand or very sandy loam amongst *Halosarcia* and *Melaleuca* on the edge of saline depressions.

## NOTES:

1. Bentham (1837) based his description of *Phyllocalymma micropodioides* on a collection made by Hügel in Western Australia. According to Stafleu (1967) the Hügel collections were acquired by the Vienna herbarium (W) in 1839. However a specimen was obtained by Bentham and is now housed at K (Bentham, 1863). It follows therefore that one should lectotypify. The W sheet of *P. micropodioides* contains three good individual specimens, the K sheet a single specimen. Thus the former sheet has been designated as the lectotype.

2. Pappus characteristics, i.e. the length of the awns and the jagged nature of the scales, were used by Steetz (1845) to distinguish *Phyllocalymma filaginoides* from *P. micropodioides*. Such characteristics are however quite variable, even within a single plant, and Bentham (1867) reduced the former species to synonymy. There are however a number of specimens in which the typical awned scales of *A. micropodioides* are absent. For example the collection *Short 1008* contains individuals with a small, jagged, ring-like pappus while a pappus is absent in specimens of *Short 992* and *Short 946*. One collection contains some individuals which lack a pappus (referred to as *Short 1012A*) and others with a distinct ring-like pappus (referred to as *Short 1012*). Future investigations may show that the latter collections represent a distinct taxon but apart from the variable characteristics of the pappus there appear to be no features by which it can be distinguished from *A. micropodioides*. It may be that the pappus variation is under simple genetic control.

3. *A. micropodioides* and *A. cornutus* exhibit a similar habit but the latter species can be readily distinguished by the presence of horn-like basal appendages on the flat capitular bracts. Furthermore the pubescent nature of the achene appears to be unique to *A. micropodioides*.

## SELECTED SPECIMENS EXAMINED (5/19):

*Western Australia* — *Chinnock 4417 & Wilson*, Mortlock river just east of Meckering, 22.xi.1978 (AD); *Morrison s.n.*, Banks of Swan Estuary, 28.xii.1898 (CANB 209968, BRI 078604, MEL 84466, PERTH); *Preiss 36*, Swan River Colonia, 1843 (MEL 583144, ex herb. Sond.; MEL 84467, ex herb. Steetz); *Short 1024*, c. 13.7 km NW. of Ballidu, 20.xi.1979 (AD); *Short 1037*, c. 8 km W. of Kalguddering, 20.xi.1979 (AD).

SPECIMENS EXAMINED, *A. micropodioides* VARIANT:

*Western Australia* — *Short 946*, 3.4 km N. of Boodarocking, 13.xi.1979 (AD); *Short 954*, Lake Campion, 14.xi.1979 (AD); *Short 968*, 45.1 km N. of Koorda along main road to Mollerin, 14.x.1979 (AD); *Short 987*, 7.9 km N. of Latham, 15.xi.1979 (AD); *Short 992*, c. 30.4 km S. of Pindar along main road to Tardun, 15.xi.1979 (AD); *Short 1008*, Yarra Yarra Lake, c. 12 km N. of Carnamah, 19.xi.1979 (AD); *Short 1021*, *1021A*, c. 54.5 km from Nugadong along main road to Gunyidi, 19.xi.1979 (AD).

9. *Angianthus cornutus* Short, sp. nov.

[*Angianthus milnei* auct. non Benth.: Grieve & Blackall, W. Aust. Wildfls 814 (1975).]

*Herba annua*. Axes maiores decumbentes ascendentesve, 3-10(16) cm longi. *Folia* alterna, linearia vel lineari-triangularia, 0.5-1(1.2) cm longa, 0.1 cm lata, mucronata, pilosa. *Glomerulus* ovoides, 0.8-1.2 cm longus, 0.3-0.6 cm diametro; bractee glomerulos subtendentes involucrium conspicuum longitudine c.  $\frac{1}{4}$ - $\frac{3}{4}$  glomeruli partes aequante facientes; receptaculum convexum vel oblongum. *Capitula* c. 30-40; bractee capitula subtendentes 1(2), obovatae  $\pm$  oblongaeve, 2.4-3 mm longae, 1.2-1.6 mm latae; costa ad apicem variabiliter pilosa. *Bractee intra capitulum*: duo concave 2.4-2.6 mm longae, costa versus apicem variabiliter pilosa; duo planae, ellipticae  $\pm$  obovatae, in infima tertia parte attenuatissimae, 2.4-3 mm longae, 0.9-1.2 mm latae, costa versus apicem varie pilosa, ad basin 2 appendicibus propriis cornuatis, c. 0.2-0.4 mm longis. *Flosculi* 2; corolla 5-lobata. *Achenia*  $\pm$  ellipsoidea, papillosa. Pappus carens.

HOLOTYPE (fig. 6): *Chinnock 4692*, Saline depression 3.8 km E. of Carnegie (25°47'S, 123°01'E). Prostrate herb growing in sand on edge of *Arthrocnemum* [= *Halosarcia*] zone. Associated with *Aizoon*, *Chrysocoryne* and *Gnephosis*. Abundant, 16.ix.1979 (AD). ISOTYPE: CANB, PERTH.

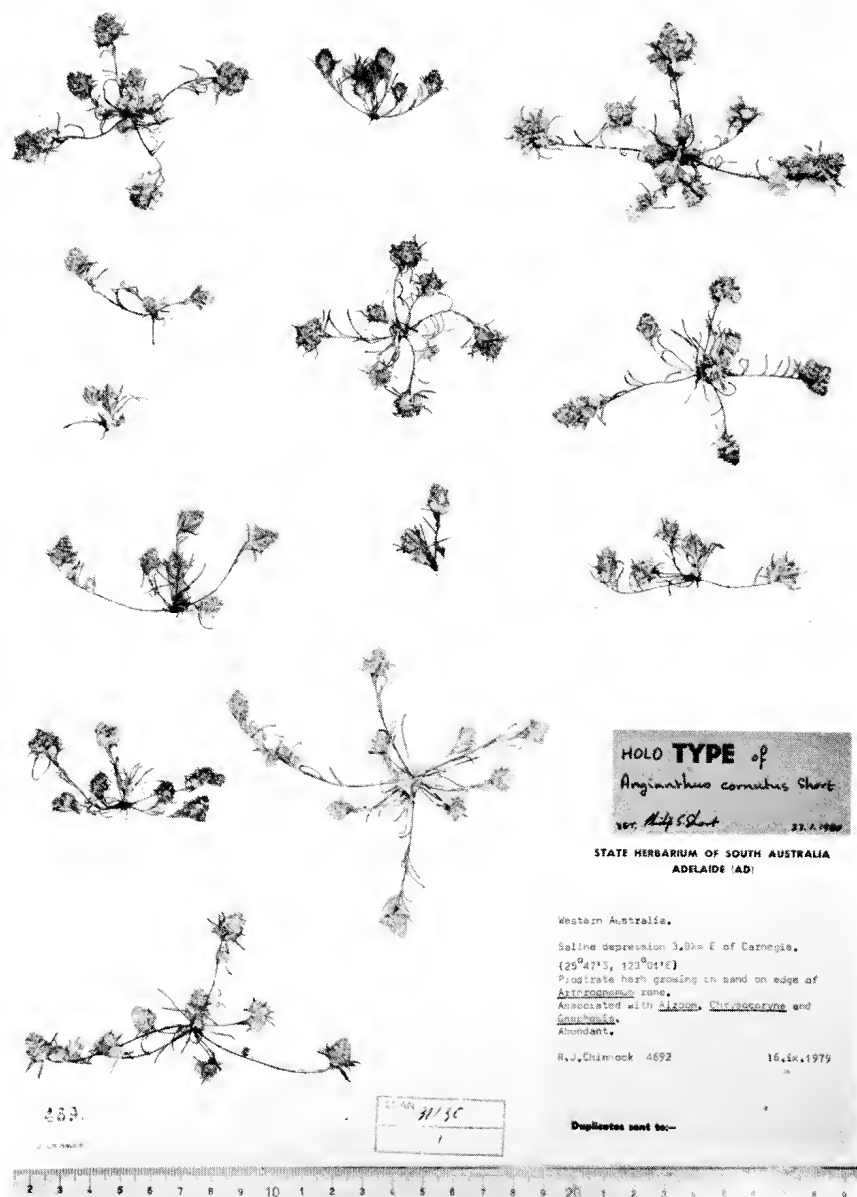


Fig. 6. *A. cornutus* Short. Holotype (Chinnock 4692, AD).

*Annual herb.* Major axes decumbent or ascending, 3-10(16) cm long, hairy; stem not distinguishable from major branches which develop from basal nodes. *Leaves* alternate, linear or linear-triangular, 0.6-1(1.2) cm long, c. 0.1 cm wide, mucronate, hairy. *Compound heads* ovoid, 0.8-1.2 cm long, 0.3-0.6 cm diam.; bracts subtending compound heads forming a conspicuous involucre extending c.  $\frac{1}{4}$  to  $\frac{3}{4}$  the length of the head, of c. 10-15 bracts, the outer ones leaf-like, linear-triangular to narrowly triangular, 0.5-0.8 cm long, c. 0.1 cm wide, mucronate, hairy, the inner ones with hyaline apices and grading into capitulum-subtending bracts; *general receptacle*  $\pm$  convex or oblong. *Capitula* c. 30-40 per compound head; capitulum-subtending bracts 1(2), if more than



one then the extra one abaxial to and overlapping the inner, all bracts obovate or  $\pm$  oblong, 2.4-3 mm long, 1.2-1.6 mm wide, the midrib variably hairy toward the apex. *Capitular bracts* with the two concave ones 2.4-2.6 mm long, the midrib variably hairy toward the apex; flat bracts 2, elliptic or obovate, abruptly attenuated in the lower  $\frac{1}{3}$ , the edge of the bracts often incurved so as to slightly cover the florets, 2.4-3 mm long, 0.9-1.2 mm wide, the midrib variably hairy toward the apex and with 2 distinct horn-like appendages, c. 0.2-0.4 mm long, at the base. *Florets* 2; corolla 5-lobed, the tube either tapering  $\pm$  gradually to a swollen base or with an abrupt taper in the lower  $\frac{1}{3}$ , the entire tube 1.5-1.8 mm long, 0.5-0.6 mm diam. *Achenes*  $\pm$  ellipsoid, c. 0.6 mm long, c. 0.3 mm diam., papillose. *Pappus* absent. Figs.: 3f, 6.

#### DISTRIBUTION (Fig. 2):

Restricted to a small area in the vicinity of Carnegie, Leonora and Wiluna, Western Australia. A single collection, *Short 1112*, from Dundas Rocks, may be referable to this species. Uncommon.

#### ECOLOGY:

Apart from the holotype collection the only habitat information is "low rocky ridge in ironstone wash area".

#### NOTE:

1. The specific epithet alludes to the horn-like basal appendages which are found on the flat capitular bracts. The affinities of this species appear to be with *A. micropodioides* (see note 3 under that species) and possibly *A. conocephalus*. It is readily distinguished from the latter species by the well developed general involucre. The involucre is inconspicuous in *A. conocephalus*.

#### SPECIMENS EXAMINED:

Western Australia — *Beaglehole 59466 & Errey 3166*, 19 km S. of Wiluna, 13.ix.1978 (ACB, AD); *Blackall s.n.*, Yandil Station, -ix.1939 (PERTH); *Blackall s.n.*, near Leonora, -ix.1939 (PERTH); *Short 1112*, salt lake at base of Dundas Rocks 25.viii.1970 (AD); *Wilson 8940*, 18 km S. of Wiluna, 28.viii.1970 (PERTH).

### 10. *Angianthus prostratus* Short, sp. nov.

*Herba annua*. Axes maiores prostrati decumbentesve, 5-20(23) cm longi, pilosi, ramis maioribus e nodis basalibus efficientibus; caulis non clarus. *Folia* alterna, sublinearia oblanceolatae, 0.5-1(2) cm longa, 0.05-0.1(0.2) cm lata, mucronata, pilosa. *Glomeruli* latissime ovoidei usque late depressoque ovoidei, 0.5-1 cm longi, 0.5-1.1 cm diametro; bractae glomerulos subtendentes involucrem clarum longitudini glomeruli aequales longioresve facientes; receptaculum latissime ovoideum. *Capitula* 20-30; bractea capitulum subtendens 1, elliptica vel ita anguste, 2.5-3(3.3) mm longa, 0.9-1.1 mm lata; costa clare pilosa in dimidio superiore, pilis bractea circa tertia parte longioribus. *Bractae intra capitulum*: duo concavae 2.6-3.2(3.4) mm longae, costa dense pilosa, pilis bractea circa tertia usque dimidia parte longioribus; planae 2, subobovatae usque oblanceolatae, 2.3-3(3.3) mm longae, 0.7-1 mm latae,  $\pm$  gradatim attenuatae, costa in dimidio superiore varie pilosa, pilis bractea circa tertia usque dimidia parte longioribus, raro e pagine adaxiali appendicem aliformem integram efficiens. *Flosculi* 2; corolla 5-lobata. *Achenia* subobovoidea, 0.7-0.9 mm longa, c. 0.5 mm diametro, varie papillosa, ad apicem circulo pilorum parvorum. *Pappus* carens.

**HOLOTYPE** (fig. 7): *Aplin 2297*, 10 miles south of Leonora on road to Menzies, 17.viii.1963 (PERTH).

*Annual herb*. Major axes prostrate or decumbent, 5-20(23) cm long, hairy; stem not distinct from the major branches which develop from basal nodes. *Leaves* alternate,  $\pm$  linear or oblanceolate, 0.5-1(2) cm long, 0.05-0.1(0.2) cm wide, mucronate, hairy. *Compound heads* very broadly to broadly depressed ovoid, 0.5-1 cm long, 0.5-1.1 cm diam.; bracts subtending compound heads forming a conspicuous involucre about equal to or exceeding the length of the head, of c. 10 bracts, the outer ones leaf-like,  $\pm$  linear or oblanceolate, 0.5-1 cm long, 0.05-0.2 cm wide, mucronate, hairy, sometimes a few inner ones with hyaline apices; *general receptacle*  $\pm$  very broadly ovoid. *Capitula* 20-30 per compound head; capitulum-subtending bract 1, narrowly elliptic to  $\pm$  elliptic, 2.5-3(3.3) mm long, 0.9-1.1 mm wide, the midrib conspicuously hairy in the upper  $\frac{1}{2}$ , the single hairs c.  $\frac{1}{3}$  the length of the bract. *Capitular bracts* with the two concave ones 2.6-3.2(3.4) mm long, the midrib densely hairy, the single hairs c.  $\frac{1}{3}$ - $\frac{1}{2}$  the length of the

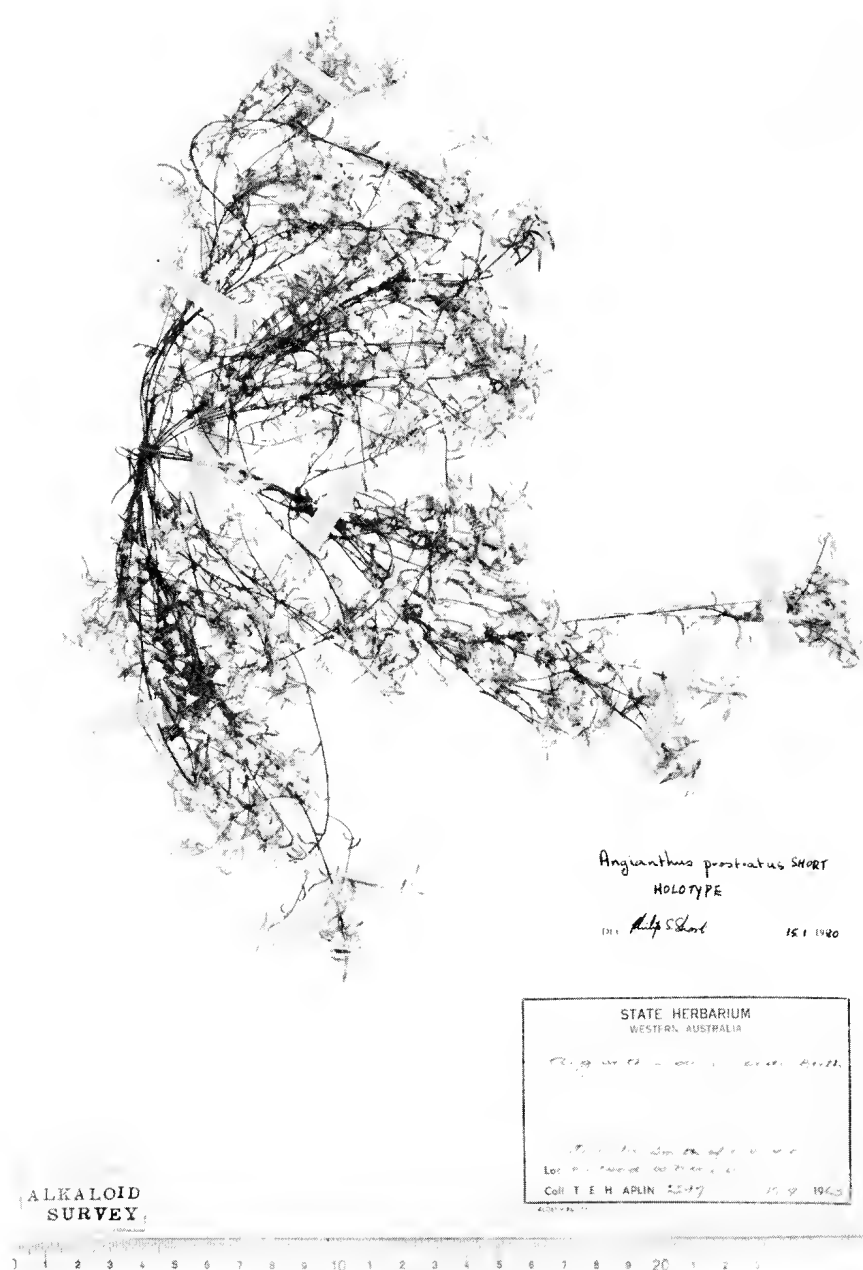


Fig. 7. *A. prostratus* Short. Holotype (Aplin 2297, PERTH).

bract; inner flat bracts 2,  $\pm$  obovate to oblanceolate,  $\pm$  gradually tapering to the base, 2.3-3(3.3) mm long, 0.7-1 mm wide, the midrib variably hairy in the upper  $\frac{1}{2}$ , the single hairs c.  $\frac{1}{3}$ - $\frac{1}{2}$  the length of the bract, rarely with an entire wing-like extension from the adaxial surface. *Florets* 2; corolla 5-lobed, the tube tapering  $\pm$  gradually to a variably swollen base, (1.7)2-2.4 mm long, c. 0.8 mm diam. *Achenes*  $\pm$  obovoid, 0.7-0.9 mm long, c. 0.5 mm diam., a conspicuous ring of small hairs at the apex, the entire achene variably papillose. Pappus absent.

Fig. 7.

## DISTRIBUTION (Fig. 2):

Restricted to Western Australia between latitudes c. 28°S and 31°S and between longitudes 119°E and 122°E.

## ECOLOGY:

Frequently grows in saline soils. Collectors' notes include "on gentle slope surrounding salt lake", "clay depression, saline" and "red loamy soil in *Eucalyptus* woodland".

## NOTE:

1. The specific epithet alludes to the common prostrate habit of the species. This character plus the long hairs on the capitulum-subtending bracts and capitular bracts readily distinguish it from all other species of *Angianthus*.

## SPECIMENS EXAMINED:

*Western Australia* — *Barker* 1909, Arrow Lake, 12.viii.1977 (AD); *Blackall s.n.*, near Paddington, -ix.1927 (PERTH); *Demarz* 5643, 6 miles N. of Bulga Downs, 24.ix.1975 (KP, PERTH); *Gardner* 2081B, Paddington, 9.ix.1927 (PERTH); *Wilson* 8806, Lake Barlee, 26.viii.1970 (PERTH).

11. ***Angianthus microcephalus*** (F. Muell.) Benth., Fl. Austr. 3:566 (1867); Grieve & Blackall, W. Aust. Wildfls 813 (1975). — *Cephalosorus microcephalus* F. Muell., Fragm. 3:158 (1863). — *Styloncerus microcephalus* (F. Muell.) Kuntze, Rev. Generum Pl. 367 (1891). TYPE: "Ad flumen Murchison. A. Oldfield." LECTOTYPE (here designated): *Oldfield s.n.*, Salt swamp, Estuary of Murchison, s. dat. (MEL 541602), (see note 1 below). ISOLECTOTYPES: K, PERTH.

*Annual herb*. Major axes decumbent or ascending, 6-10(21) cm long, variably hairy; stem not distinct from the major branches which develop from basal nodes. *Leaves* alternate or opposite, succulent when fresh, narrowly elliptic or  $\pm$  linear, 0.3-1(1.2) cm long, c. 0.1 cm wide, slightly mucronate, hairy. *Compound heads* broadly ovoid to very broadly ovoid, 0.35-0.6(0.8) cm long, 0.35-0.5(0.6) cm diam.; bracts subtending compound heads forming a conspicuous involucre extending c.  $\frac{1}{4}$ - $\frac{1}{2}$  the length of the head, of c. 10 bracts, the outer ones leaf-like, narrowly elliptic to elliptic or lanceolate to ovate, 0.3-0.4 cm long, 0.1-0.15 cm wide, mucronate, hairy, the inner ones with hyaline apices and grading into capitula-subtending bracts; *general receptacle*  $\pm$  oblong or ovoid. *Capitula* c. 10-40 per compound head; capitulum-subtending bract 1,  $\pm$  oblong or ovate or obovate, 1.7-2.4 mm long, 0.45-1.1 mm wide, the midrib usually glabrous but sometimes a few glandular hairs present toward the apex. *Capitular bracts* with the two concave ones 1.7-2 mm long, the midrib glabrous; flat bracts absent or ? 1 only. *Florets* 1; corolla 5-lobed, the tube tapering gradually toward the base, 1-1.4 mm long, c. 0.4 mm diam. *Achenes*  $\pm$  obovoid, 0.45-0.6 mm long, c. 0.2 mm diam., papillose. Pappus of 2 or 3 ovate scales, 0.2-0.4 mm long, each scale terminating in a variably barbellate bristle extending to c.  $\frac{2}{3}$  the length of the corolla, the total pappus length 0.8-1.1 mm.

## DISTRIBUTION Fig. 2:

North west of Western Australia between latitudes 25°S and 27°S and west of longitude 117°E. Locally common.

## ECOLOGY:

Commonly grows in saline areas. Collectors' notes include "Clay salt flat. Growing with *Arthrocnemum* [= *Halosarcia*], *Salicornia* [= *Sarcocornia*]" and "On old shell beds and clay".

## NOTES:

1. The collection MEL 541602 has been designated the lectotype of *Cephalosorus microcephalus*. It could possibly be regarded as the holotype as it is the only collection labelled in Mueller's hand and it is possible that the K collection, which was acquired from the Oldfield herbarium, was not seen by Mueller. The PERTH collection is a fragment of the lectotype acquired by C. A. Gardner this century.

2. *A. microcephalus* is readily distinguished from other species of *Angianthus* by the presence of only 1 floret per capitulum and the absence of 2 inner flat bracts within each capitulum. In all other respects the species is typical of *Angianthus*.

#### SPECIMENS EXAMINED:

*Western Australia* — Cannon 317, Hamelin Pool Station, 24.ix.1974 (PERTH); George 11439, Dirk Hartog Is., 3.ix.1972 (PERTH); Short 442, c. 3 km N. of Eagle Bluff, Peron Peninsula, 21.viii.1977 (AD); D. G. W. M3B23, Roderick River, Boolardy, 28.x.1953 (PERTH).

12. *Angianthus drummondii* (Turcz.) Benth., Fl. Austr. 3:566 (1867); Grieve & Blackall, W. Aust. Wildfls 814 (1975). — *Skirrhophorus drummondii* Turcz., Bull. Soc. Imp. Naturalistes Moscou 24(1):188 (1851) ('*Scirrhophorus*'). — *Stylancerus drummondii* (Turcz.) Kuntze, Rev. Generum Pl. 367 (1891). TYPE: "Nova Hollandia. Drum. 111.n.123." POSSIBLE HOLOTYPE: KW (see p.152). ISOTYPES: K, MEL 541210, NSW, PERTH.

*Angianthus platycephalus* Benth., Fl. Austr. 3:566 (1867); Grieve & Blackall, W. Aust. Wildfls 814 (1975). — *Stylancerus platycephalus* (Benth.) Kuntze, Rev. Generum Pl. 367 (1891). TYPE: "Tone River, Oldfield." HOLOTYPE: Oldfield 85, Wet places, Tone R., W. Aust., s. dat (K), (see note 1 below). ISOTYPES: MEL 541607, PERTH. POSSIBLE ISOTYPE: MEL 541606 (lacks collector's number).

*Annual herb.* Major axes  $\pm$  decumbent or ascending to erect, 2-7 cm long, variably hairy; stem simple or forming major branches at basal nodes. *Leaves* alternate or opposite,  $\pm$  linear, c. 0.5-1 cm long, c. 0.1 cm wide, variably mucronate, hairy. Compound heads  $\pm$  broadly ovoid, 0.4-0.6 cm long, 0.5-0.7 cm diam.; bracts subtending compound heads forming a conspicuous involucre about the length, or exceeding the length, of the head, of c. 10 bracts, the outer ones leaf-like,  $\pm$  linear or oblanceolate or  $\pm$  elliptic, 0.5-1 cm long, 0.1-0.3 cm wide, variably mucronate, hairy; *general receptacle* a small convex or slightly elongate axis. *Capitula* c. 20-60 per compound head; capitulum-subtending bracts 1(?)2,  $\pm$  oblong or obovate, c. 2 mm long, c. 1 mm wide, the midrib glabrous or variably hairy toward the apex. *Capitular bracts* with the two concave ones c. 2 mm long, the midrib variably hairy toward the apex; flat bracts 2, obovate,  $\pm$  gradually tapering toward the base, c. 2 mm long, c. 1 mm wide, the midrib glabrous or variably hairy toward the apex and with an entire wing-like extension from the adaxial surface. *Florets* 2; corolla 5-lobed, the tube tapering gradually to the base, c. 1.8 mm long, c. 0.8 mm diam. *Achenes*  $\pm$  obovoid, c. 0.8 mm long, c. 0.3 mm diam., papillose. Pappus a very small jagged ring, c. 0.1 mm long.

#### DISTRIBUTION (Fig. 2):

An uncommon species restricted to the south west of Western Australia. Specimens referred to as a variant of *A. drummondii* are similarly restricted.

#### ECOLOGY:

The only information available comes from the holotype collection of *A. platycephalus*. The plants on the sheet are growing in clumps of moss and the label records them as growing "in wet places".

Specimens referred to as a variant of *A. drummondii* favour saline regions. Collectors' notes include "sandy loam in *Arthrocnemum* [= *Halosarcia*]/*Melaleuca* zone around salty depression" and "on sandy island . . . Growing with *Arthrocnemum* [= *Halosarcia*] & *Frankenia*".

#### NOTES:

1. The K collection of Oldfield 85 is regarded as the holotype of *A. platycephalus*. There is no indication that Bentham saw any of the MEL material, usually indicated by the initial 'B' on the herbarium labels, and the PERTH collection is a fragment of the K type material acquired this century by C. A. Gardner.

2. Bentham (1867) regarded *A. platycephalus* and *A. drummondii* as distinct species, the former having a small jagged ring-like pappus, the latter none. However a small, jagged, ring-like pappus is discernible in the type material of *A. drummondii* and apart from minor habit differences (erect axes in *Drummond 123* and more or less

decumbent ones in *Oldfield* 85) no differences are discernible between the type collections.

There is an allied variant of *A. drummondii*. Several collections of immature plants, *Ehrendorfer* 181, *George* 7293, *Short* 664 & *Short* 694, and three collections of mature plants, *Demarz* 6640, *Short* 1102 & *Wittwer* 588, contain individuals which lack a pappus. All but three of these collections are from the same location, Lake King. The plants possibly represent a distinct taxon, perhaps a subspecies of *A. drummondii*, but further collections are required to substantiate this view.

Both *A. drummondii* and its variant have close affinities to *A. pygmaeus* and *A. preissianus*. Unlike *A. preissianus* they do however have primarily 5-lobed florets and are outbreeders (*Short* 1981a, b). The pappus of *A. drummondii* also readily distinguishes it from both *A. pygmaeus* and *A. preissianus*. The variant of *A. drummondii* and *A. pygmaeus* closely resemble each other. However the latter taxon normally has prostrate or decumbent axes and broadly depressed to depressed ovoid compound heads whereas in the variant of *A. drummondii* the axes are ascending to erect and the compound heads are broadly to very broadly ovoid.

#### SPECIMENS EXAMINED:

*Western Australia* — *Morrison* s.n., Hotham River, 12.xi.1904 (PERTH); *Mueller* s.n., Harvey River, 5.xii.1877 (MEL 85700); *Mueller* s.n., Preston River, 5.xii.1877 (MEL 85701).

#### SPECIMENS EXAMINED, *A. drummondii* VARIANT:

*Western Australia* — *Demarz* 6640, Lake Muir Swamp, 21.xi.1977 (KP); *Ehrendorfer* 181, south coast area — Walpole/Albany/Stirling Ranges, 14.xii.1966 (PERTH); *George* 7293, Lake King, 3.xi.1965 (PERTH); *Short* 664, c. 20.5 km S. of Lake Grace along road to Pingrup, 24.ix.1977 (AD); *Short* 694, Lake King, 26.ix.1977 (AD); *Short* 1102, Lake King, 26.xi.1979 (AD).

13. ***Angianthus pygmaeus*** (A. Gray) Benth., Fl. Austr. 3:567 (1867); Diels & Pritzel, Bot. Jahrb. Syst. 35:612, fig. 69A-E (1905); Grieve & Blackall, W. Aust. Wildfls 815 (1975). — *Skirrhophorus pygmaeus* A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:148 (May 1851) ('Skirrophorus'). — *Styloncerus pygmaeus* (A. Gray) Kuntze, Rev. Generum Pl. 367 (1891). TYPE: "South-western Australia, Drummond." LECTOTYPE (here designated): *Drummond* 59, S.W. Australia, s. dat. (K). ISOLECTOTYPES: GH (ex herb. Klatt), MEL 541610, NSW, PERTH (see note 1 below).

*Skirrhophorus mucronulatus* Turcz., Bull. Soc. Imp. Naturalistes Moscou 24 (2):72 (Oct. 1851). TYPE: "Nova Hollandia. Drum.v.n.59." HOLOTYPE: ?CW, n.v. (see p.152). ISOTYPES: GH, K. MEL 54160, NSW, PERTH.

*Annual herb*. Major axes usually prostrate or decumbent, rarely ascending or erect, c. 0.5-6(9) cm long, variably hairy; stem sometimes simple and often  $\pm$  lacking, but usually forming major branches at basal nodes. *Leaves* alternate or opposite,  $\pm$  narrowly elliptic or  $\pm$  linear, sometimes semi-succulent, c. 0.3-1 cm long, c. 0.1 cm wide, mucronate, glabrous or slightly hairy. *Compound heads* broadly depressed to depressed ovoid, c. 0.2-0.4 cm long, 0.2-0.6(1) cm diam.; bracts subtending compound heads forming a conspicuous involucre c.  $\frac{3}{4}$  or about the length of the head, of c. 5-10 leaf-like bracts,  $\pm$  elliptic or ovate, 0.3-0.5 cm long, 0.1-0.3 cm wide, often with a small hyaline margin, mucronate, variably hairy, a few inner ones with hyaline apices and grading into capitula-subtending bracts; *general receptacle* convex. *Capitula* (4)15-50(c.70) per compound head; capitulum-subtending bracts 1,  $\pm$  obovate or  $\pm$  oblong, 1.7-2.4 mm long, 0.7-1.5 mm wide,  $\pm$  white, the midrib glabrous or slightly hairy toward the apex. *Capitular bracts* with the two outer concave ones 1.6-2.2 mm long,  $\pm$  white, the midrib glabrous or sparsely hairy toward the apex; flat bracts 2, obovate,  $\pm$  gradually tapering toward the base, 1.6-2.2 mm long, 0.6-1 mm wide,  $\pm$  white, the midrib glabrous or sparsely hairy toward the apex and with an entire wing-like extension from the adaxial surface. *Florets* 2; corolla (?4)5-lobed, the tube tapering gradually to a sometimes variably swollen base, 0.9-1.3 mm long, c. 0.5 mm diam. *Achenes*  $\pm$  obovoid, 0.5-0.7 mm long, c. 0.2-0.3 mm diam., variably papillose and often with a fringe of papillae at the apex. Pappus absent.

## DISTRIBUTION (Fig. 2):

Restricted to the salt lakes of the Avon River System, Western Australia (Short 1981a, b). Uncommon.

## ECOLOGY:

Appears to grow exclusively in sandy soil on the margins of saline depressions. Commonly associated with species of *Halosarcia* and *Disphyma*.

## NOTES:

1. The lectotype sheet of *Skirrhophorus pygmaeus* contains drawings of the species which, according to Gray (1851), were to be illustrated in *Icones Plantarum*. This did not eventuate. The sheet is also clearly inscribed with the words "*Skirrhophorus pygmaeus* n.sp." in Gray's hand. It is possible that the sheet could be regarded as the holotype as there is no clear indication that Gray saw any of the duplicates.

2. As pointed out under the respective species *A. pygmaeus* has close affinities with *A. preissianus* and *A. drummondii* and, in particular, to a variant of *A. drummondii*.

## SPECIMENS EXAMINED:

*Western Australia* — *Chinnock 4158*, c. 3.5 km W. of eastern edge of Lake King, 26.ix.1977 (AD); *Chinnock 4359*, Eclipse Lake, 11.xi.1978 (AD); *Chinnock 4366*, small salt pan 0.7 km beyond western edge of Lake King, 12.xi.1978 (AD, PERTH); *Gardner s.n.*, Mortlock River flats, E. of Meckering, 22.x.1945 (PERTH); *Pritzel 902*, Avon district, -.xi.1901 (NSW); *Short 617*, 3.4 km E. of Meckering in Mortlock River, 20.ix.1977 (AD); *Short 674*, 1 km E. of Wave Rock, 25.ix.1977 (AD); *Wilson 6386a*, 3 km E. of Meckering, 23.xi.1967 (PERTH).

14. ***Angianthus preissianus*** (Steetz) Benth., Fl. Austr. 3:566 (1867); K. Hoffman in Engler & Prantl., *Naturl. Pflanzenfam.* 1V5:194, fig. 98A (1890); J. M. Black, Fl. S. Aust. 1st ed. 645 (1929), 2nd ed. 924 (1957); W. M. Curtis, Stud. Fl. Tas. 344 (1963); Willis, *Handb. Pl. Vict.* 2:730 (1973); Grieve & Blackall, W. Aust. Wildfls 814 (1975). — *Skirrhophorus preissianus* Steetz in Lehm. Pl. Preiss. 1:439 (1845). — *Stylancerus preissianus* (Steetz) Kuntze, Rev. Generum Pl. 367 (1891). TYPE: "In umbrosis madidis inter frutices prope lacum ad Woodman's point, mense Dec. 1838. Herb. Preiss. No. 38." LECTOTYPE (here designated): *Preiss 38*, In Nova Hollandia, (Swan-River Colonia) in umbrosis madidis inter frutices prope lacum ad Woodman's point, s. dat. (MEL 541608, ex herb. Steetz). ISOLECTOTYPES: LD, MEL 541609, S (see p.152).

*Skirrhophorus eriocephalus* Hook. f. ex A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:148 (1851) (Hook. f. in MSS); Hook. f., Fl. Tas. 1:198, pl. 53A (1856). — *Angianthus eriocephalus* (Hook. f. ex A. Gray) Benth., Fl. Austr. 3:567 (1867); W. M. Curtis, Stud. Fl. Tas. 344 (1963). — *Stylancerus eriocephalus* (Hook. f. ex A. Gray) Kuntze, Rev. Generum Pl. 367 (1891). TYPE: "Georgetown, Van Diemen's Land, Gunn." LECTOTYPE (here designated): *Gunn 1973*, George Town, 21.xi.1842 (K). ISOLECTOTYPES: HO, NSW, NSW p.p. (lacks collector's no. but cites Georgetown and the dates 21.xi.42 & 10.i.43, i.e. a mixed collection). POSSIBLE ISOLECTOTYPES: GH (several collections ex herb. Hook. f. but each lacks collection date, collector's no. and gives the location only as Tasmania or "VDL").

*Annual herb.* Major axes erect to prostrate (0.5)4-10(16) cm long, glabrous or variably hairy; stem often simple in the smaller, erect plants, sometimes  $\pm$  lacking (less than c. 1 cm high) in the prostrate ones, but usually forming major branches at basal and/or upper nodes. *Leaves* alternate or opposite, usually  $\pm$  narrowly elliptic or  $\pm$  linear, sometimes semi-succulent to succulent and  $\pm$  terete, 0.5-1(1.2) cm long, c. 0.1-0.2 cm wide, mucronate, variably hairy. *Compound heads* broadly ovoid to depressed ovoid, 0.4-0.8(1) cm long, 0.4-0.7(1) cm diam.; bracts subtending compound heads forming a conspicuous involucre about the length of the head, of c. 15 bracts, the outer ones leaf-like,  $\pm$  elliptic, or ovate to lanceolate, 0.5-1 cm long, 0.1-0.2 cm wide, variably mucronate, hairy, a few inner ones with hyaline apices and grading into capitulum-subtending bracts; *general receptacle* an expanded, convex axis. *Capitula* c. 5-100 per compound head; capitulum-subtending bracts 1(2), if more than one then the extra one abaxial to and overlapping the inner, all bracts  $\pm$  obovate or  $\pm$  oblong, 1.7-2.4(2.6) mm long, 0.7-1.5 mm wide,  $\pm$  white, the midrib glabrous or variably hairy

toward the apex. *Capitular bracts* with the two concave ones 1.6-2.3 mm long,  $\pm$  white, the midrib variably hairy toward the apex; flat bracts 2, obovate,  $\pm$  gradually tapering toward the base, (1.5)1.6-2.3 mm long, 0.6-1 mm wide,  $\pm$  white, the midrib glabrous or sparsely hairy toward the apex and usually with an entire wing-like extension from the adaxial surface. *Florets* 2; corolla 3(4, 5)-lobed, the tube tapering  $\pm$  gradually to a sometimes variably swollen base, 0.9-1.4 mm long, c. 0.4-0.5 mm diam.; anthers 3(4, 5), each with c. 16-44 pollen grains. *Achenes*  $\pm$  obovoid, 0.5-0.8 mm long, c. 0.3 mm diam., variably papillose and often with a fringe of glandular hairs at the apex. Pappus absent. Fig. 3e.

#### DISTRIBUTION (Fig. 2):

Coastal and inland regions of south western Australia, South Australia, Victoria and Tasmania. Very common.

#### ECOLOGY:

Favours saline habitats and sandy soils. Commonly associated with species of *Halosarcia*, *Sarcocornia* and *Frankenia*.

#### NOTES:

1. The lectotype sheet of *S. eriocephalus* contains at least two collections. On the lower  $\frac{1}{3}$  of the sheet there are drawings, a label and a blue envelope containing specimens which are regarded as the lectotype material. Above this there are some further specimens attached to the sheet. These may possibly belong to Mueller's Brighton collection which is in a further envelope at the top of the sheet although they do match material in the type envelope.

2. *A. preissianus* exhibits a great deal of variation. Commonly collections contain specimens with erect or ascending major axes and variably hairy, non-succulent leaves. However other collections, e.g. *Orchard 1439*, *Royce 9731* and *Short 1013*, are of more or less glabrous specimens with short axes and succulent leaves. Further variation may also be found in the wing-like extension on the adaxial surface of the inner capitular bracts. Usually a single membranous wing extends from the axis but in some cases, e.g. *Royce 9731* and *Tepper s.n.* MEL 84892, two wings are present. In a further collection, *Short 932*, an inner wing is absent. Specimens also exhibit variation in the placement of leaves (opposite or alternate) and the number of papillae at the apex of the mature achenes. Much of the variation exhibited by *A. preissianus* may well be environmentally induced; certainly the habit of the plant is largely dependent on the degree of shading. Some variation may also be a reflection of the ability of inbreeders (Short, 1981a, b) to produce highly adapted biotypes.

3. Bentham (1867) and Curtis (1963), although commenting on the variation exhibited by the taxa, recognised both *A. preissianus* and *A. eriocephalus*. Due to the variation exhibited the latter species is regarded as a synonym of *A. preissianus*. The recognition of an infraspecific taxon is not warranted.

4. A number of authors, e.g. Bentham (l.c.), Curtis (l.c.) and Grieve and Blackall (1975), have described *A. preissianus* as having a small pappus. However the pappus appears to be best interpreted as a cluster of papillae at the apex of the achene. The same papillae are found over much of the fruit.

5. *A. preissianus* is very closely related to *A. pygmaeus*, *A. drummondii* and the variant of *A. drummondii*. Indeed all taxa may, under certain conditions display a similar habit to *A. preissianus* and the taxa can then only be discerned on microscopic characters. *A. preissianus* is best distinguished from all related taxa by its 3- or rarely 4-lobed florets which reflect the inbreeding nature of the species (Short, 1981a, b). *A. drummondii*, the variant of *A. drummondii* and *A. pygmaeus* all have 5-lobed florets.

#### SELECTED SPECIMENS EXAMINED (14/158):

*Western Australia* — *Drummond 122*, W.A., s. dat. (MEL, NSW); *Eichler 20305*, c. 30 km NNE. of the coast at Stokes Inlet, 18.x.1968 (AD, PERTH); *Orchard 1439*, c. 38 km N. of the coast at Stokes Inlet, 10.x.1968 (AD, PERTH); *Royce 9731*, E. of boundary of Watheroo National Park, 7.x.1971 (PERTH); *Short 932*, c. 47 km E. of Yellowdine, 13.xi.1979 (AD); *Short 1013*, c. 14 km from Jurien along main road to

Badgingarra, 19.xi.1979 (AD); *Short 1052*, saline flat running into Leschenault Inlet, c. 3 km from Bunbury, 22.xi.1979 (AD).

*South Australia* — *Martinsen 60*, Mambray Creek, 12.ix.1974 (AD); *Short 716*, 8.6 km S. of Corny Point Lighthouse, 9.ix.1977 (AD); *Short 800*, c. 10 km south of Streaky Bay, 26.ix.1978 (AD); *Tepper s.n.*, Kangaroo Island, 1886 (MEL 84892).

*Tasmania* — *Rodway s.n.*, River Derwent, 3.xii.1899 (NSW 138738); *Whinray 221*, Cape Barren Island, 3.xi.1973 (AD).

*Victoria* — *Morrison s.n.*, Port Melbourne, 7.xii.1892 (BRI 078641, MEL 225623, PERTH).

15. ***Angianthus cunninghamii*** (DC.) Benth., Fl. Austr. 3:565 (1867); Grieve & Blackall, W. Aust. Wildfls 815, pl. 13 (1975). — *Skirrhophorus cunninghamii* DC., Prod. 6:150 (1838); DC. in Deless., Icon. Select. Pl. 4:22, t.51 (1840); Steetz in Lehm. Pl. Preiss. 1:438 (1845); A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:148 (1851). — *Styloncerus cunninghamii* (DC.) Kuntze, Rev. Generum Pl. 367 (1891). TYPE: "In arenosis insulae anglis dictae Dirk Hartog's ad oram occid. Australiae januario flor. legit cl. A. Cunningham." HOLOTYPE: *Cunningham s.n.*, Sandy downs, Dirk Hartog's Island. West Coast Australia, -i.1822 (G in herb. DC., ex microfiche IDC). ISOTYPES: K (excl. illus., ex herb. Allan Cunningham), MEL 541221 (see note 1 below).

*Eriocladium pyramidatum* Lindl., Edwards' Bot. Reg.: Swan River Append. 24 (1839). HOLOTYPE: *Toward 15*, Swan River, s. dat. (CGE, herb. J. Lindley), (see note 2 below).

*Perennial shrub*, 20-50 cm high. Major axes  $\pm$  erect and densely hairy. *Leaves* alternate, often recurved, oblanceolate or ovate, 0.5-2(2.6) cm long, 0.2-0.3 cm wide, densely hairy. *Compound heads* broadly to broadly depressed ovoid, 0.5-0.9 cm long, 0.45-0.8 cm diam.; bracts subtending compound heads forming a conspicuous involucre extending c.  $\frac{1}{3}$  the length of the head, of c. 20 bracts, the outer ones leaf-like,  $\pm$  ovoid, 0.2-0.3 cm long, 0.1-0.15 cm wide, densely hairy, the inner ones with hyaline appendages and grading into capitulum-subtending bracts; *general receptacle* ovoid to very broadly ovoid, c. 2-3 mm long, c. 2 mm diam. *Capitula* c. 25-50 per compound head; capitulum-subtending bract 1, obovate to  $\pm$  oblanceolate, sometimes  $\pm$  narrowly oblong to oblong, (2.6)3.1-3.8(4.1) mm long, (1)1.2-1.5(1.65) mm wide, with the upper part of the lamina yellow and with a prominent constriction, the midrib usually sparsely hairy toward the apex and some glandular hairs always present. *Capitular bracts* with the two concave ones (2.3)2.9-3.5(3.7) mm long, with the upper part of the lamina yellow and with a prominent constriction, the midrib usually with a few glandular hairs; flat bracts 2, oblanceolate or  $\pm$  narrowly oblong, gradually tapering to the base, (2.8)3-3.6(3.75) mm long, (0.6)0.7-1(1.2) mm wide, the lamina with a prominent constriction in the upper part, the midrib usually with a few glandular hairs. *Florets* 2 (3); corolla 5-lobed, the tube tapering  $\pm$  gradually to the base which is distinctly swollen in mature florets, 2-2.5 mm long, c. 0.5 mm diam., glandular hairs often present. *Achenes*  $\pm$  obconical, 0.9-1.4 mm long, 0.5-0.6 mm diam., papillose. Pappus absent.

#### DISTRIBUTION (Fig. 2):

Western coastline of Australia between latitudes 20°S and 32°S. Common.

#### ECOLOGY:

Commonly grows in the unconsolidated calcareous sands of coastal foredunes but also grows in saline flats. Collectors' notes include "Low salt flats with mangrove and *Salicornia*" and "Growing on unconsolidated foredunes".

#### NOTES:

1. The sheets referred to as isotypes of *S. cunninghamii* have slightly different wording. On the K sheet there is a reference to "sandy plains" rather than "sandy downs" as on the holotype. The MEL sheet has the words "Frequent on desert plains of sand". Despite these discrepancies both probably can be regarded as isotypes although the number "288" which also appears on the MEL label suggests that this may not be correct.

2. Lindley (1839) based his descriptions of new species from the Swan River Colony on specimens he obtained from Drummond, Mangles, Toward and Ward. No particular



collection was specified for *Eriocladium pyramidatum* but *Toward 15* is the only one of the species in Lindley's herbarium and is thus regarded as the holotype. Drummond also collected this species, i.e. *Drummond 125* (MEL, GH), *Drummond ? 159* or *245* (GH ex herb. Klatt) and *Drummond s.n.* (MEL 541216), but there is no reason to believe that Lindley saw any of these collections.

3. *A. cunninghamii* is the only perennial species of *Angianthus* and the only one to occasionally produce 3 florets per capitulum. Both characters suggest that the species is a somewhat primitive member of the genus.

#### SELECTED SPECIMENS EXAMINED (6/36):

*Western Australia* — *Allender s.n.*, Shark Bay, 18.ii.1969 (UWA 2493); *Demarz 2890*, Vlaming Head, 4.xi.1970 (PERTH); *Kenneally 1014*, Dorre Island, 15.xii.1973 (PERTH); *Morrison s.n.*, Claremont, 28.iii.1900 (BRI 086974); *Serventy s.n.*, Bernier Island, 5.viii.1947 (PERTH); *Serventy s.n.*, Stewart Island, s. dat. (PERTH).

2. **Pleuropappus** F. Muell., Trans & Proc. Vict. Inst. Advancem. Sci. 37 (1855). TYPE: *P. phyllocalymmeus* F. Muell.

[*Angianthus* auct. non Wendl.: see synonymy of *P. phyllocalymmeus*.]

[*Styloncercus* auct. non Spreng., *nom. illeg.*: see synonymy of *P. phyllocalymmeus*.]

*Annual herb*. Major axes erect or ascending, sometimes decumbent, hairy; stem simple or forming major branches at basal and/or upper nodes. *Leaves* mainly alternate but opposite at the base of the stem, sessile, entire, linear, mucronate, hairy. *Compound heads* narrowly ellipsoid or lanceoloid to ovoid; bracts subtending compound heads forming a conspicuous involucre c.  $\frac{1}{4}$  the length of the head, the outer ones leaf-like, the inner ones with hyaline apices; *general receptacle* cylindrical to narrowly oblong, consisting of a single major axis lacking minor receptacular axes, the individual capitula distributed  $\pm$  evenly along its entire length. *Capitula* 40-100 per compound head, each capitulum with 4 (5, 6) abaxial, hyaline subtending bracts that overlap the inner capitular bracts. *Capitulum-subtending bracts* arranged so that an outer bract covers 2 middle bracts which in turn cover a single inner bract, sometimes 1-2 additional bracts covering the inner 4, all bracts flat, ovate or elliptic; midrib usually conspicuous, opaque, c.  $\frac{1}{3}$ - $\frac{1}{2}$  the length of the bract, variably hairy. *Capitular bracts* 4, hyaline, with an opaque midrib, arranged so that 2 outer concave bracts surround 2 inner flat bracts. Concave bracts with the midrib conspicuous, c.  $\frac{1}{2}$  the length of the bract, variably hairy. Inner flat bracts obovate, abruptly attenuated in the lower  $\frac{1}{3}$ - $\frac{1}{2}$ ; the midrib conspicuous, c.  $\frac{1}{2}$  the length of the bract, glabrous or hairy. *Florets* 2 per capitulum; corolla 5-lobed; style branches truncate; stamens 5, with tailed anthers. *Achene* obliquely attached to the floret, ellipsoid, papillose. Pappus an oblique jagged scale. Fig. 1h.

#### DISTRIBUTION (Fig. 8):

A monotypic genus confined to southern Eyre Peninsula and southern Yorke Peninsula. It is poorly collected and Jessop (1977) recorded *P. phyllocalymmeus* as an endangered species. However field observations suggest that the species, although geographically restricted, is locally common.

#### AFFINITIES/GENERIC CHARACTERISTICS:

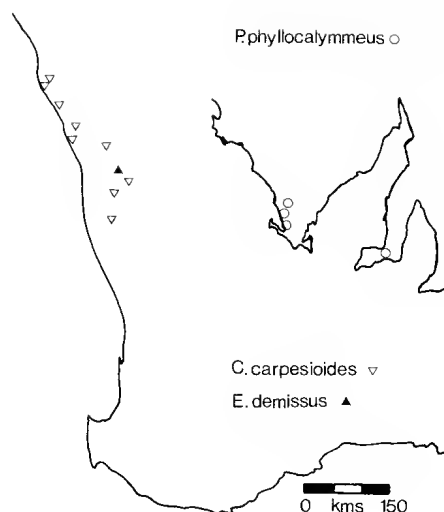
*Pleuropappus phyllocalymmeus* superficially resembles many species of *Angianthus* with similar shaped compound heads. Furthermore, there are 4 capitular bracts which are arranged in the same manner as those in *Angianthus*. However *Pleuropappus* is readily distinguished by the presence and arrangement of 4 or more capitulum-subtending bracts, by the obliquely attached achenes and by the absence of minor receptacular appendages on the general receptacle of the compound head.

#### EVOLUTION/REPRODUCTIVE BIOLOGY:

Although accurate determinations of pollen-ovule ratios (P/Os) have not been made it is apparent that a P/O value of several thousand will be found in this species. Such a value suggests that the species commonly cross-pollinates (Short, 1981a, b).

Ants have been observed on flowering compound heads and are possibly important pollen vectors.

Fig. 8. Distribution of *Pleuropappus phyllocalymmeus* (South Australia), *Cephalosorus carpesioides* and *Epitriche demissus* (Western Australia).



***Pleuropappus phyllocalymmeus*** F. Muell., Trans & Proc. Vict. Inst. Advancem. Sci. 37 (1855). — *Angianthus phyllocalymmeus* (F. Muell.) Druce, Bot. Soc. Exch. Club Brit. Isles 4:604 (1917); Domin, Mem. Soc. Sc. Boheme 2:121 (1923) ('*phyllocalymmeus*'); J. M. Black, Fl. S. Aust. 1st ed. 645 (1929), 2nd ed. 924 (1957); Hj. Eichl., Suppl. to J. M. Black's Fl. S. Aust. 326 (1965). — *Angianthus pleuropappus* Benth., Fl. Austr. 3:563 (1867) *nom. illeg.* — *Stylancerus phyllocalymmeus* (F. Muell.) Kuntze, Rev. Generum Pl. 367 (1891) ('*phyllocalymmeus*'). TYPE: "On sterile plains of the Port Lincoln district. — *C. Wilhelmi*." LECTOTYPE (here designated): *Wilhelmi* s.n., Port Lincoln, s. dat. (K). PROBABLE ISOLECTOTYPES: MEL 541617-541619, MEL 84469 (see note 1).

*Annual herb*, 4-8(15) cm high. *Leaves* 0.7-1(1.3) cm long, c. 0.1 cm wide. *Compound heads* 0.8-1.5(2) cm long, c. 0.3-0.5 cm diam.; *bracts subtending compound heads* c. 10, the outer ones leaf-like, narrowly elliptic or lanceolate, 0.5-1 cm long, 0.1-0.15 cm wide,  $\pm$  mucronate, hairy, the inner ones with hyaline apices and grading into capitulum-subtending bracts. *Capitula* 40-100 per compound head; capitulum-subtending bracts ovate or elliptic, 1.8-2.2 mm long, 1-1.2 mm wide. *Capitular bracts* with the two outer concave ones c. 2 mm long; flat bracts abruptly attenuated in lower  $\frac{1}{3}$ - $\frac{1}{2}$  and the edges sometimes incurved so as to slightly cover the florets, 2-2.3 mm long, 0.9-1.3 mm wide. *Florets* 2; corolla 5-lobed, the tube usually tapering gradually to the base but sometimes an abrupt taper occurring in the lower  $\frac{1}{3}$ , 1.3-1.7 mm long, c. 0.5 mm diam. *Achene* obliquely attached to the floret, ellipsoid, 0.7-0.8 mm long, 0.3-0.4 mm diam., papillose. Pappus an oblique jagged scale about the length of the corolla tube.

DISTRIBUTION: See generic treatment.

ECOLOGY:

Grows exclusively in sandy or clay loam on the margins of saline depressions. Associated with *Halosarcia*.

NOTE:

1. Following his description of *P. phyllocalymmeus* Mueller (1855, p.37) cited a single collection, "On sterile plains of the Port Lincoln district. — *C. Wilhelmi*." None of the Wilhelmi collections from MEL & K are designated in this manner but a K collection is recorded as coming from "Port Lincoln".

Because of confusion with the labels of the MEL collections (see annotations on the sheets), the K material, which contains 2 individual specimens in good condition, has been designated as the lectotype. The same sheet also contains Wilhelmi material designated as coming from "between the Fountain & Long Lake" but this material has been clearly separated from the lectotype. A further label "Victoria, South Australia, July 26/55, Mueller" occurs on the sheet but both the location and the name, "*Chrysocoryne tenella* Muell." (= *C. drummondii* A. Gray) suggests that it has been erroneously placed with this material.

#### SELECTED SPECIMENS EXAMINED (6/13):

*South Australia* — *Alcock* 2801, Lower Eyre Peninsula, Hundred of Lake Wangary, 14.x.1969 (AD, CANB); *Cleland s.n.*, Coffin Bay Reserve, 10.xi.1960 (AD 96404182); *Lang* 1082, c. 33.7 km WNW. of Cummins on road to Mt. Hope, 20.x.1977 (AD); *Short* 806, c. 34 km NW. of Cummins on road to Mt. Hope, 26.ix.1978 (AD); *Short* 823, c. 13.5 km W. of Yorketown along main Warooka road, 28.x.1978 (AD); *Wilhelmi s.n.*, Lake Greenly, 1855 (NSW 138697).

3. *Epitriche* Turcz., Bull. Soc. Imp. Naturalistes Moscou 24(2):74 (Oct. 1851). TYPE: *E. cuspidata* Turcz. (= *E. demissus* (A. Gray) Short)

*Skirrhophorus* DC. in Lindl. ex DC. sect. *Psuedopappus* A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:149 (May 1851). TYPE: *S. demissus* A. Gray (= *E. demissus* (A. Gray) Short)

[*Angianthus* auct. non Wendl.: see synonymy of *E. demissus*.]

[*Styloncerus* auct. non Spreng.: see synonymy of *E. demissus*.]

*Annual herb*. Major axes erect, glabrous or sparsely hairy; stem simple or forming major branches at upper nodes. *Leaves* opposite, sessile, the base  $\pm$  stem clasping and with hyaline margins, the entire leaf glabrous or sparsely hairy. *Compound heads* broadly depressed ovoid; bracts subtending compound heads forming a conspicuous involucre c. equal to or longer than the head; *general receptacle* an entire, convex,  $\pm$  smooth axis, the capitula distributed evenly over its surface. *Capitula* c. 10-20 per compound head. *Capitular bracts* 2 or 3, hyaline,  $\pm$  flat to concave, with a conspicuous, sparsely hairy midrib extending c.  $\frac{1}{2}$  the length of the bract, the bracts overlapping one another. *Florets* 1 per capitulum; corolla 5-lobed; style branches truncate; stamens 5, with tailed anthers. *Achenes* ?  $\pm$  obconical and papillose, the apex beset with long hairs. Pappus absent.

#### DISTRIBUTION (Fig. 8):

A monotypic genus endemic to the south-west of Western Australia. Known only from the type collection and *Wilson* 8314.

#### AFFINITIES/GENERIC CHARACTERISTICS:

The lack of collections has made it difficult to ascertain certain characteristics of this genus and the full range of variation exhibited by the species is unknown. For example characteristics of the achene are difficult to ascertain and the number of capitula per compound head has been estimated for only 2 or 3 individuals.

At least superficially the genus appears to be allied to *Angianthus* s.str. However the apparent lack of minor receptacular appendages, the absence of capitulum-subtending bracts and the distinctive ring of hairs at the apex of the achene all suggest that the genus should be reinstated. There is some doubt whether or not the hairs at the apex of the achene should be regarded as a pappus (see morphology section).

#### *Epitriche demissus* (A. Gray) Short, comb. nov.

*Skirrhophorus demissus* A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:149 (May 1851), basionym. — *Angianthus demissus* (A. Gray) Benth., Fl. Austr. 3:567 (1867); Greive & Blackall, W. Aust. Wildfls 815 (1975). — *Styloncerus demissus* (A. Gray) Kuntze, Rev. Generum Pl. 367 (1891). TYPE: "South-western Australia, Drummond, 1850." LECTOTYPE (here designated); *Drummond* 58, S.W. Australia, 1850 (K) (label in Gray's hand, plus drawings). ISOLECTOTYPES: GH (ex herb. Klatt), K (ex herb. Benth.), KW, MEL 541627, MEL 84428, NSW, PERTH (2 sheets).

*Epitriche cuspidata* Turcz., Bull. Soc. Imp. Naturalistes Moscou 24(2):75 (Oct. 1851). TYPE: "Nova Hollandia. Drum.V.n.58." POSSIBLE HOLOTYPE: KW (see p.152). ISOTYPES: GH (ex herb. Klatt), K (2 sheets), MEL 541627, MEL 84428, NSW, PERTH (2 sheets).

*Annual herb*, 2-5 cm high. *Leaves*  $\pm$  lanceolate, 0.5-1 cm long, c. 0.3 cm wide. *Compound heads* 0.3-0.5 mm long, 0.4-0.6 cm diam.; bracts subtending compound heads c. 10-15, the outer ones leaf-like, glabrous or sparsely hairy, the inner ones densely hairy. *Capitula* c. 10-20 per compound head. *Capitular bracts* oblanceolate, 2-2.8 mm long, c. 0.5-0.7 mm wide. *Florets* 1; corolla 5-lobed, the tube bulb-like at the base, 1.7-1.9 mm long, c. 0.3 mm diam. *Achenes* ? obconical and papillose, the apex beset with long hairs which are c.  $\frac{1}{2}$ - $\frac{2}{3}$  the length of the floret.

DISTRIBUTION: See generic treatment.

#### ECOLOGY:

Recorded growing in clay soil (*Wilson 8314*). No other information available.

#### SPECIMENS EXAMINED:

*Western Australia* — *Wilson 8314*, c. 5 km S. of Three Springs, [c. 29°32'S, 115°46'E], 25.vii.1969 (PERTH).

4. *Cephalosorus* A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:98 (April 1851), 152 (May 1851). LECTOTYPE (here designated): *C. phyllocephalus* A. Gray (= *C. carpesioides* (Turcz.) Short).

*Piptostemma* Turcz., Bull. Soc. Naturalistes Moscou 24 (1):191 (March 1851) *nom. illeg.*, [later homonym of *Piptostemma* Spach., Hist. Veg. Phan. 10:34 (1841).] TYPE: *P. carpesioides* Turcz. (= *C. carpesioides* (Turcz.) Short)

[*Angianthus* auct. non Wendl.: see synonymy of *C. carpesioides*.]

[*Styloncerus* auct. non Spreng., *nom. illeg.*: see synonymy of *C. carpesioides*.]

*Annual herb*. Major axes erect, variably hairy; stem distinct, hollow, simple or with opposite branching from upper nodes. *Leaves* opposite or alternate, petiolate or sessile, entire, lamina  $\pm$  elliptic or oblanceolate to obovate, variably hairy. *Compound heads* broadly depressed to depressed ovoid; bracts subtending compound heads forming a conspicuous involucre  $\frac{1}{2}$  to c. the length of the head; the outer ones leaf-like, the inner ones hyaline toward the base, all bracts glabrous to variably hairy; *general receptacle* an entire, broadly depressed ovoid axis, the capitula sessile and distributed evenly over the surface. *Capitula* c. 30-60 per compound head. *Capitular bracts* 3 or 4(5), hyaline,  $\pm$  flat, or concave, the laminae rarely with a distinct constriction in the upper part, the bracts  $\pm$  overlapping each other; the midrib  $\pm$  conspicuous and extending c.  $\frac{2}{3}$  the length of the bracts, variably hairy at or near the apex. *Florets* 1 per capitulum; corolla 5-lobed; style branches truncate; stamens 5, with tailed anthers. *Achenes*  $\pm$  obovoid, with a cellular, diaphanous pellicle. Pappus a jagged cup.

#### DISTRIBUTION (Fig. 8):

A monotypic genus confined to the south-west of Western Australia between latitudes 28°S and c.31°S and west of longitude 116°E.

#### NOMENCLATURAL PROBLEMS:

1. Gray (1851) described two species, namely *C. phyllocephalus* and *C. gymnocephalus*, in his new genus *Cephalosorus*. The generic description supplied covers the major characteristics of both species and there is nothing to suggest that either one should be given preference when selecting a lectotype. *C. gymnocephalus* clearly differs from *C. phyllocephalus* and is allied to species in the genus *Gnephosis* s.l., to which Bentham referred the species in 1867. Thus it is convenient to designate *C. phyllocephalus* as the lectotype species of *Cephalosorus*. *C. gymnocephalus* is excluded from the genus.

#### AFFINITIES/GENERIC CHARACTERISTICS:

*Cephalosorus* has no obvious affinities with other segregate genera of *Angianthus*.

It is readily distinguished by the opposite, petiolate leaves which occur in at least the lower half of the plant. Achene morphology and the morphology, number and arrangement of capitular bracts are unique.

***Cephalosorus carpesioides* (Turcz.) Short, comb. nov.**

*Piptostemma carpesioides* Turcz., Bull. Soc. Naturalistes Moscou 24(1):192 (March 1851), basionym. TYPE: "Nova Hollandia. Drum. coll. IV. n. 200." POSSIBLE HOLOTYPE: KW (see p.152). ISOTYPES: GH (ex herb. Klatt), K, MEL 541595, MEL 541596.

*Cephalosorus phyllocephalus* A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:152 (May 1851). — *Angianthus phyllocephalus* (A. Gray) Benth., Fl. Austr. 3:565 (1865); Grieve & Blackall, W. Aust. Wildfls 812 (1975). — *Stylancerus phyllocephalus* (A. Gray) Kuntze, Rev. Generum Pl. 367 (1891). TYPE: "Swan River, Drummond, 1846, 1848." LECTOTYPE (here designated): *Drummond 200*, S.W. Australia, 1848 (K). ISOLECTOTYPES: GH (ex herb. Klatt), MEL 541595, MEL 541596 (see note 2 below).

*Cephalosorus brevipapposus* F. Muell., Fragm. 3:159 (1863). — *Skirrhophorus phyllocephalus* F. Muell., l.c., pro syn., (? as to collections of F. Muell.). TYPE: "Ad flumen Murchison; Oldfield. Ad sinum Champion Bay; Walcott." LECTOTYPE (here designated): *Oldfield s.n.*, Murchison R., W.A., s. dat. (MEL 541597). PROBABLE ISOLECTOTYPE: PERTH (ex MEL, referred to as *Angianthus phyllocephalus* on label). SYNTYPE: None seen, the only specimens of this species seen from Champion Bay were collected by Oldfield. No Walcott specimens of the species have been seen.

*Annual herb*, 15-25(29) cm high. Leaves opposite and distinctly petiolate in at least the lower half of the plant, the uppermost ones frequently  $\pm$  sessile and alternate; petiole  $\pm$  absent to c. 2 cm long, variably hairy; laminae  $\pm$  elliptic or oblanceolate to obovate, 1-2.5(3.4) cm long, 0.4-1(1.3) mm wide, sometimes with a very small mucro at the apex, almost glabrous (particularly the lower surface) to densely hairy. *Compound heads* 0.5-1.4 cm high, 0.7-1.5 cm diam.; bracts subtending compound head c. 10-20, the outer ones  $\pm$  ovate or  $\pm$  obovate, 0.5-1(1.4) cm long, 0.3-0.8 cm wide. *Capitula* c. 30-60 per compound head. *Capitular bracts* 3.3-4.2 mm long, (0.7)1-1.8 mm wide. *Florets* 1; corolla tube with a conspicuously swollen base, the tube 1.5-2 mm long, 0.5-0.8 mm diam. *Achenes*  $\pm$  obovoid, 1.9-2.5 mm long, 0.9-1 mm diam. Pappus a jagged cup c. 0.7 mm long.

DISTRIBUTION: See generic treatment.

ECOLOGY:

Little information is available. Collectors' notes include "Common on rocky ironstone knoll" and "Ironstone gravel".

NOTE:

1. The lectotype sheet of *C. phyllocephalus* contains three good, entire specimens, plus drawings of the species. According to Gray (1851) the species was to be illustrated in *Incones Plantarum* but this did not eventuate. A label attached to the sheet has the words "*Cephalosorus phyllocephalus* n. gen." in Gray's hand.

SPECIMENS EXAMINED:

*Western Australia* — *Alpin 56*, 1-2 miles North of Carnamah, 4.ix.1958 (PERTH); *Burns 24*, Port Gregory road, 20.ix.1970 (PERTH); *Gardner 12831*, Arrino, 27.ix.1960 (PERTH); *?Mueller s.n.*, Port Gregory, -.x.1877 (MEL 84472); *?Mueller s.n.*, upper Irwin River, s. dat. (MEL 84473); *Oldfield s.n.*, Champion Bay, s. dat. (MEL 84471). *Paust 1267*, 1 mile N. of Northampton-Port Gregory road on Yerina Springs road, 6.x.1972 (PERTH); *Wilson 3829*, 15 km N. of Badgingarra, 2.ix.1965 (AD, GH, PERTH).

(To be continued in *Muelleria* 5(3):185)



# Muelleria

Volume 5, Number 3

January to August, 1982

## CONTENTS

	Page
A revision of <i>Angianthus</i> Wendl., sensu lato (Compositae: Inuleae: Gnaphaliinae), 2	
— P. S. Short . . . . .	185
<i>Storckiella australiensis</i> sp. nov. (Caesalpinaceae) from northern Queensland: a new generic record for Australia	
— J. H. Ross and B. P. M. Hyland . . . . .	215
<i>Asplenium terrestre</i> and two <i>Asplenium</i> hybrids: new fern records for Australia	
— P. J. Brownsey . . . . .	219
<i>Grevillea montis-cole</i> sp. nov. (Proteaceae) from Victoria	
— R. V. Smith . . . . .	223

Editor: Helen I. Aston

Published by the National Herbarium of Victoria (MEL).  
Royal Botanic Gardens, South Yarra, Victoria 3141, Australia.  
D. M. Churchill, Director and Government Botanist.





**A REVISION OF ANGIANTHUS WENDL., SENSU LATO  
(COMPOSITAE: INULEAE: GNAPHALIINAE), 2**

by

P. S. SHORT\*

(Continued from *Muelleria* 5(2):183)

5. *Chrysocoryne* Endl., Bot. Zeitung (Berlin) 1:457 (July 1843); Endl., Gen. Pl. Suppl. 3:70 (Oct. 1843); Steetz in Lehm. Pl. Preiss. 1:441 (1845); A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:151 (1851); F. Muell., Trans. & Proc. Vict. Inst. Advancem. Sci. 130 (1855) (as sect. *Bisquama*); F. Muell., Hook. J. Bot. Kew Gard. Misc. 8:149 (1856) (reprint of preceding). TYPE: *C. drummondii* A. Gray (see note 1)

[*Angianthus* auct. non Wendl.: see synonymy of *C. drummondii*, *C. pusilla* & *C. uniflora*.]

[*Crossolepis* auct. non Less.: see synonymy of *C. drummondii* & *C. pusilla* & notes 1 & 2.]

[*Siloxerus* auct. non Labill.: see synonymy of *C. drummondii* & *C. pusilla*.]

[*Styloncerus* auct. non Spreng., nom. illeg.: see synonymy of *C. drummondii*, *C. pusilla* & *C. uniflora*.]

*Annual herbs*. Major axes ascending or erect, with scale-like glandular hairs; stem simple or forming major branches at basal and/or upper nodes. *Leaves* alternate, sometimes  $\pm$  opposite, sessile, entire, with some scale-like glandular hairs. *Compound heads* narrowly ellipsoid to ellipsoid or oblanceoloid to obovoid or cylindrical to oblong; bracts subtending compound heads not forming a conspicuous involucre but several leaf-like bracts with hyaline apices present, grading into capitulum-subtending bracts. *General receptacle* a simple undivided axis with the capitula arranged in a spike, minor receptacular axes absent. *Capitula* 30-100(250) per compound head, each capitulum with 1 abaxial, hyaline, subtending bract that overlaps the capitular bracts. *Capitulum subtending bracts*  $\pm$  widely elliptic or widely depressed ovate or  $\pm$  widely to widely depressed obovate, sometimes  $\pm$  circular; midrib large, c.  $\frac{1}{3}$  the total width and c.  $\frac{1}{2}$  the total length of the bract, entire and with an obtuse apex (or as in *C. trifida* only, distinctly lobed), glabrous or variably hairy. *Capitular bracts* 2, or to c. 10, hyaline, flat to concave, lamina with a distinct constriction in the upper part and with entire margins (*C. pusilla* only) or lacking a constriction and with the margins variably hairy; the midribs variably conspicuous; the bracts either distinctly paired and opposite one another or arranged in  $\pm$  1 or 2 whorls around the florets. *Florets* 1-5(8) per capitulum; corolla 3, 4 or 5-lobed; style branches truncate; stamens 3, 4 or 5, with tailed anthers. *Achenes*  $\pm$  obconical, variably papillose, pink or pale purple. Pappus a small jagged ring or a ring with several apically divided bristles or absent.

Figs: 1a-e; 9; 10.

DISTRIBUTION (See Short 1981a, fig. 4):

Southern and central Australia. Four of the six species grow only on the margins of salt lakes in Western Australia. The lakes occur in a number of major drainage divisions and constituent systems recognised by Mulcahy & Bettenay (1972) and Bettenay & Mulcahy (1972). Species distribution appears to have been greatly affected by drainage patterns (Short 1981a,b).

ECOLOGY:

All species commonly grow on the margins of saline depressions. Only *C. pusilla* and *C. drummondii* are capable of growing in non-saline habitats.

---

\*National Herbarium of Victoria, Birdwood Avenue, South Yarra, Victoria 3141.

*Muelleria* 5(3):185-214 (1983).

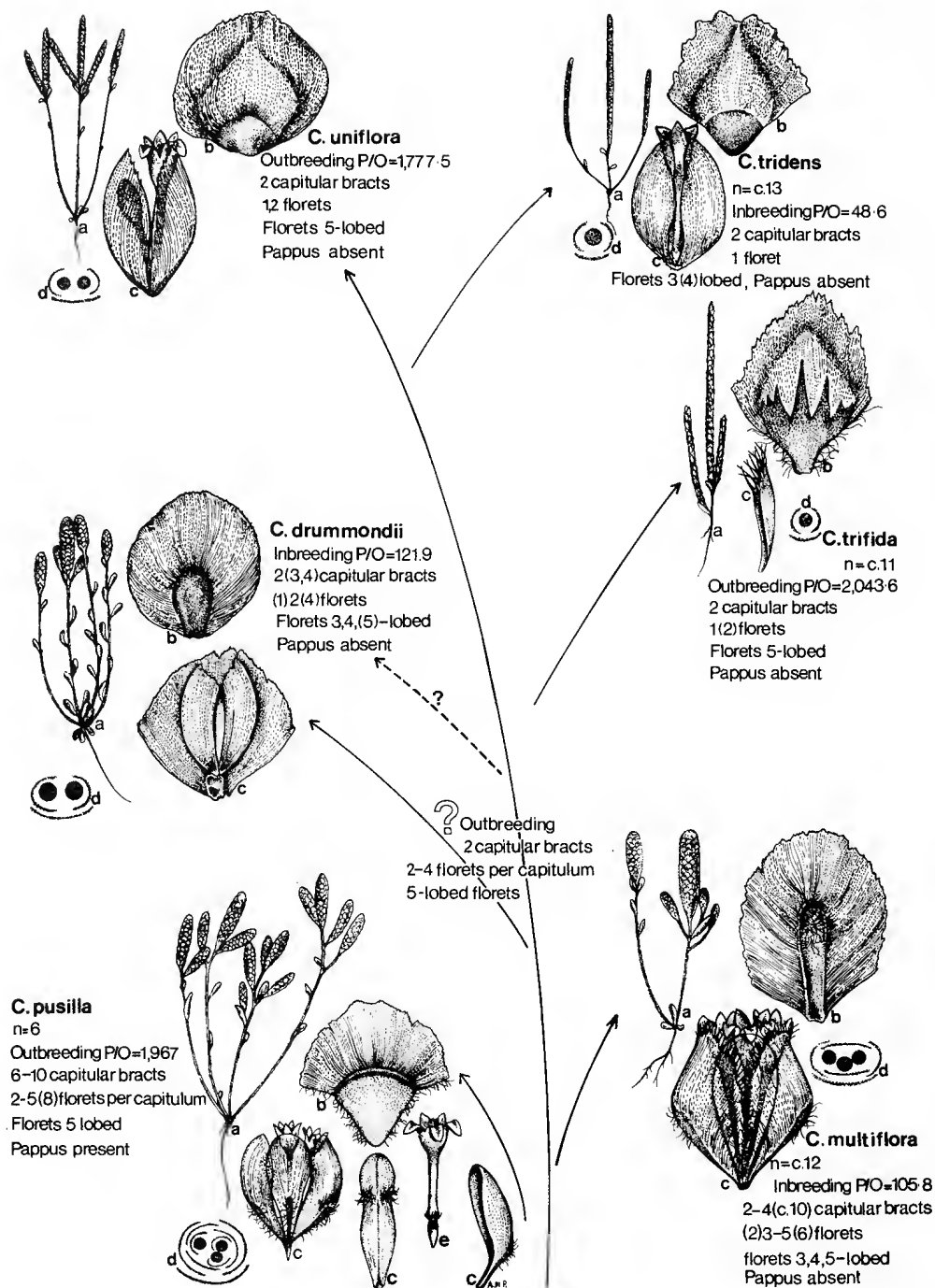


Fig. 9. Proposed phylogeny of *Chrysocoryne* species. a — habit, approx. life size. b — capitulum-subtending bracts. c — capitula and/or capitular bracts. d — arrangement of florets, capitular bracts and capitulum-subtending bracts. e — floret. All florets and bracts approximately 16 x magnification. *C. pusilla* (Short 902), *C. multiflora* (Short 1046), *C. drummondii* (Short 1085), *C. trifida* (Short 966), *C. uniflora* (Short 1026), *C. tridens* (Short 1063).

Although further data are desirable it appears that sandy soils are preferred by those species restricted to salt lakes. To date no species have been collected from Lake Koorkoordinate (near Southern Cross) and other lakes in that vicinity. The margins of these lakes have clay loam rather than sandy soil. Sandy soils are common throughout the systems in which species of *Chrysocoryne* occur.

Habitat differences appear to be of little importance in maintaining specific differences but *C. pusilla*, when growing on the margins of salt lakes, is rarely observed to be growing amongst samphire (primarily *Halosarcia* spp.), a common habitat of all other species.

#### NOMENCLATURAL PROBLEMS:

1. When Endlicher (1843) transferred *Crossolepis pusilla* Benth. to his new genus *Chrysocoryne* he erroneously applied the new combination to another, at that time undescribed species of *Chrysocoryne*, namely *C. drummondii* A. Gray. This is evident from both the description and the reference to an illustration published by W. J. Hooker (1841) in *Icones Plantarum*. (Hooker incorrectly referred his illustration of *C. drummondii* to *Crossolepis pusilla*). The type of the genus *Chrysocoryne* is therefore *C. drummondii* A. Gray. The combination *Chrysocoryne pusilla* (Benth.) Endl. is retained (under Art. 55) for *Crossolepis pusilla*.

2. In 1832 Lessing described the genus *Crossolepis* and placed within it a single species, *C. linifolia* Less. Despite the fact that they had not seen type material and that Lessing's description was extremely brief and the affinities of the taxon consequently unclear, subsequent authors, i.e. Bentham (1837) & Gray (1851), attributed several new species to the genus, e.g. *C. pusilla* Benth. (1837). No type material has been seen by the current author but it is quite clear that *C. pusilla* is generically distinct from *C. linifolia*. Indeed the c. 10 flowered capitula readily distinguishes *C. linifolia* from all species of *Angianthus* s.l.

#### AFFINITIES/GENERIC CHARACTERISTICS:

*Chrysocoryne* is readily distinguished from all other members of *Angianthus* s.l. by the distinctive nature of the capitulum-subtending bracts, the morphology and colour of the achenes and the presence of scale-like glandular hairs on the major axes and leaves. The nature and arrangement of the capitular bracts are also distinctive. Its affinities are unclear, the resemblance to some members of *Angianthus* s.str. being superficial.

#### EVOLUTION:

As indicated by pollen-ovule ratios (P/O's) (Short 1981a, b) three of the species of *Chrysocoryne*, namely *C. pusilla*, *C. uniflora* and *C. trifida* are outbreeders whereas *C. multiflora*, *C. drummondii* and *C. tridens*, are inbreeders. Other differences between the species occur in respect to the number of lobes per floret, number of florets per capitulum, number of capitular bracts per capitulum and number of capitula per 1 cm length of compound head (table 1). Differences in habit, bract morphology and chromosome number also occur. A tentative phylogeny may be seen in fig. 9.

Within *Chrysocoryne*, *C. pusilla* must be regarded as the taxon with the most primitive attributes. It is the only species with a pappus, has a large number of capitular bracts and florets per capitulum, has pentamerous florets, is an outbreeder and has a haploid chromosome number of 6.

*Chrysocoryne multiflora* must be closely related to *C. pusilla*. Like the latter species it has a number of capitula with 4 or more capitular bracts and also possesses 3-5-flowered capitula. However unlike *C. pusilla* the number of capitular bracts per capitulum is not more or less constant within a compound head. In fact there is apparently a general trend from c. 6-10 capitular bracts per capitulum at the base of a compound head to usually 2 bracts per capitulum in the upper half of the head. The derived nature of the species is also reflected by the presence of 3, 4 or 5-lobed florets, (sometimes within the one capitulum and certainly within any one compound head), and the low P/O.

The four remaining species possess 2 capitular bracts per capitulum. Of the four, *C. drummondii* appears to have the closest affinities with *C. pusilla* and *C. multiflora*.

Table 1. Characteristics of *Chrysocoryne* species

Species						
Character	<i>pusilla</i>	<i>uniflora</i>	<i>trifida</i>	<i>multiflora</i>	<i>drummondii</i>	<i>tridens</i>
Average P/O	1,967	1,777.5	2,043.6	105.8	121.9	48.6
Number of lobes per floret	5	5	5	3,4,5	3,4,(5)	3(4)
Number of bracts per capitulum	6-10	2	2	2-4 (c.10)	2(3,4)	2
Pappus	present	absent	absent	absent	absent	absent
Chromosome no. (n)	6	?	c.11	c.12	?	c.13
Number of florets per capitulum	2-5(8)	1 or 2	1(2)	(2)3-5(6)	(1) 2 (4)	1
Average no. of capitula per 1 cm length of compound head	28.7	37.2	26.6	114.6	70.6	47.7
Potential seed set (average no. of flowers per 1 cm length of compound head)	69.7	48.3	26.6	412.5	134.1	47.7

Although most populations contain individuals with 2-flowered capitula at least one collection (*Cronin* MEL 84705) from Western Australia has 3- and 4-flowered capitula. (A further Western Australian collection, *Andrews* PERTH s.n., contains a single individual with 1-flowered capitula). *C. uniflora*, *C. tridens* and *C. trifida* have 1- or 2-flowered capitula only. Hence floret number suggests affinities of *C. drummondii* with *C. pusilla* and *C. multiflora*. The species is also an inbreeder and has both 3- and 4-lobed florets.

Although the affinities of *C. drummondii* appear to be with the above species it is tempting to suggest that it has been derived from an outbreeding entity with 2 capitular bracts per capitulum, 2-4-flowered capitula and pentamerous florets. Such a hypothetical taxon would also explain the derivation of the remaining species. Thus *C. uniflora* is an outbreeding species with 1- or 2-flowered capitula (within any one compound head) and pentamerous florets. In this respect it differs from the hypothetical entity in floret number alone. *C. trifida* is very similar to *C. uniflora* in that it too is an outbreeder, has 1- or 2-flowered capitula and pentamerous florets. However *C. trifida* is readily distinguishable from all species of *Chrysocoryne*, by the distinctly 3-lobed nature of the midrib of the capitulum-subtending bracts and the small capitular bracts with long hairs on their upper margins. Both characters attest to the derived nature of the species, other taxa having capitulum-subtending bracts with entire midribs and more or less entire capitular bracts. In all but *C. pusilla*, which has capitular bracts with entire laminae, the upper margins of the bracts are variably ciliate. The hairs on the bracts of *C. trifida* appear to be a consequence of the 'splitting' of cells making up the entire, one cell thick, bracts. A similar process would also explain the decrease in bract number in the capitula of *C. multiflora*.

The remaining species, *C. tridens*, undoubtedly has strong affinities with *C. uniflora*. The compound heads, capitulum-subtending bracts and capitular bracts of the 2 species are almost identical, *C. tridens* differing by having strictly 1-flowered capitula, 3-lobed florets, smaller, bisporangiate anthers and an average P/O of 48.6. A difference also appears in the habit. Both *C. uniflora* and *C. tridens*, (and indeed all species of *Chrysocoryne*), occasionally produce plants which consist of nothing more than a short stem terminating in a compound head. Again all species often produce several major axes which branch from basal nodes. However, unlike other species *C. tridens* is incapable of branching from the upper nodes of major axes.

Chromosome numbers have not been determined for all species but the counts obtained, i.e. n=6, c.11, c.12 & c.13 for *C. pusilla*, *C. trifida*, *C. multiflora* and *C. tridens* respectively, suggest that the evolution of the group has primarily proceeded at the tetraploid level (Short 1981b).

## REPRODUCTIVE BIOLOGY:

There is no evidence of hybridisation within *Chrysocoryne* despite the fact that a number of species commonly grow in the same locality, e.g. all but *C. trifida* have been collected from the saline Mortlock River flats near Meckering. Specific differences are presumably maintained by a number of parameters including differences in chromosome number, habitat preferences (e.g. as in *C. pusilla*, see above ecology notes) and flowering time (e.g. *C. tridens* appears to flower some days earlier than *C. uniflora*, a species with which it commonly grows). These factors, combined with the inbreeding nature of three of the species, must present formidable barriers to interspecific crossing.

Flies and ants are commonly seen on most species of *Chrysocoryne* but their importance as pollinators is not known. It appears that the fruit of at least some species are a useful food supply for ants. Ants have been observed transporting c. 1 cm lengths of compound heads of *C. tridens* to their nests.

Potential seed set has been established for all species (table 1; Short, 1981b) and it is evident that values obtained for inbreeding ones are similar to or greater than those of closely related outbreeders. The significance of the values is open to question. It may well be that an increase in seed set is a method by which genetic heterogeneity is maintained in inbreeding taxa. On the other hand an increase in seed set, which is correlated with an increase in the number of capitula per unit length of compound head, may perhaps be a reflection of selection for reduced inflorescence size and a consequent shorter life cycle. Such an hypothesis has already been suggested to explain the large number of unrelated taxa in the "*Angianthus* group", a group characterised by having compound heads.

## KEY TO SPECIES OF CHRYSOCORYNE

1. Capitular bracts 2-6(c. 10); capitula with (2)3-5(8) florets
  2. Pappus a small jagged ring, sometimes with several apically divided bristles extending c.  $\frac{1}{2}$  the length of the floret; capitular bracts with entire margins; florets 5-lobed; compound heads narrowly ellipsoid to ellipsoid or oblanceoid to  $\pm$  obovoid, sometimes  $\pm$  ovoid, 1-1.5(2.2) cm long, 0.3-0.5(0.7) cm diam., (fig. 10a-f) ..... 1. *C. pusilla*
  2. Pappus absent; capitular bracts with ciliate margins; florets 3, 4 & 5-lobed; compound heads narrowly oblong to oblong, c. 0.5-2 cm long, c. 0.25-0.4(0.45) cm diam., (fig. 10g-h) ..... 2. *C. multiflora*
1. Capitular bracts 2; capitula usually with 1 or 2 florets (rarely 3 or 4 in *C. drummondii*)
  3. Midrib of capitulum-subtending bracts with at least 3 distinct lobes; capitular bracts with long hairs on the upper margins, the hairs  $\frac{1}{3}$ - $\frac{1}{2}$  (c. 0.5 mm long) the length of the bracts; capitula with 1, rarely 2, florets, (fig. 10k-m) ..... 4. *C. trifida*
  3. Midrib of capitulum-subtending bracts not divided; capitular bracts with variably ciliate margins, the hairs c. 0.1 mm long; capitula with 1 or 2, rarely 3 or 4, florets
    4. Florets mainly 5-lobed; (250)300-400(500) pollen grains per anther; compound head cylindrical to narrowly oblong, c. 1.5-3(3.6) cm long ..... 5. *C. uniflora*
    4. Florets 3 or 4-lobed; (8)12-64 pollen grains per anther; compound heads cylindrical to narrowly oblong and (c. 1)3-5(6.3) cm long or narrowly oblong and c. 1-2(2.5) cm long
      5. Compound heads narrowly oblong, c. 1-2(2.5) cm long, c. 0.2-0.25(c. 0.3) cm diam.; capitula with (1)2(3,4) florets; stem simple or branching from basal &/or upper nodes, (fig. 10i-j) ..... 3. *C. drummondii*
      5. Compound heads cylindrical to narrowly oblong (c. 1)3-5(6.3) cm long, 0.15-0.2 cm diam.; capitula with 1 floret; stem simple or branching from basal nodes, never branching from upper nodes ..... 6. *C. tridens*

1. *Chrysocoryne pusilla* (Benth.) Endl., Bot. Zeitung (Berlin) 1:458 (1843) (in name only, see note 1, p.187; Steetz in Lehm. Pl. Preiss. 1:441 (1845) p.p., excl. *C. drummondii* as to ref. to Hook., Icon. Pl. 5:pl. 413 (1841). — *Crossolepis pusilla* Benth. in Endl. Enum. Pl. 61 (1837); DC., Prod. 6:158 (1838). — *Chrysocoryne huegelii* A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:151 (1851), *nom. illeg.* — *Angianthus pusillus* (Benth.) Benth., Fl. Austr. 3:564 (1867); Hoffman in Engler & Prantl. Naturl. Pflanzenfam. 1V5:194, Fig. 98C-G (1890); F. M. Bail., Qd. Fl. 848 (1900); J. M. Black, Fl. S. Aust. 1st ed. 645 (1926), 2nd ed. 925 (1957); Willis, Handb. Pl. Vict. 2:729 (1973); Grieve & Blackall, W. Aust. Wildfls 813 (1975). — *Stylancerus pusillus* (Benth.) Kuntze, Rev. Generum Pl. 367 (1891) — *Siloxerus pusillus* (Benth.) Ising, Trans & Proc. Roy. Soc. S. Aust. 46:604 (1922). TYPE: "Swan River. (Hügel.)". LECTOTYPE (here designated): *Hügel s.n.*, Swan River, s.dat. (W). ISOLECTOTYPE: K.

*Angianthus pusillus* var. *polyanthus* Benth., Fl. Austr. 3:564 (1867). TYPE: "Murray and Darling Desert." LECTOTYPE (here designated): *Anon*, s.n., Victorian Expedition, Murray and Darling Desert, s. dat. (K). POSSIBLE ISOLECTOTYPES: MEL 541203, MEL 541204, MEL 84537, MEL 84538 (see note 1 below).

*Chrysocoryne angianthoides* F. Muell., Linnaea 25:404 (1853); Sond., Linnaea 25:488 (1853). TYPE: "In virgultis deserti pone Cudnaka". LECTOTYPE (here designated): *Mueller* s.n., In den gestrüppen zwischen Cudnaka & Arkaba, -x.1851 (MEL 541201). ISOLECTOTYPES: MEL 541200, MEL 541202. PROBABLE ISOLECTOTYPES: GH (ex herb. Sond.), MEL 84532 (ex herb. Sond.) (see note 2 below).

*Annual herb*, (1.7)3-10(15) cm high. Major axes erect or ascending, with scale-like glandular hairs; stem simple or forming branches at basal and/or upper nodes. *Leaves* alternate, sometimes  $\pm$  opposite, linear or elliptic to narrowly elliptic or obovate to oblanceolate, 0.2-1.5(3.3) cm long, 0.05-0.3(0.4) cm wide, a small hyaline appendage often present at the apex, all leaves with scale-like glandular hairs. *Compound heads* usually narrowly ellipsoid to ellipsoid or  $\pm$  oblanceoloid to  $\pm$  obovoid, sometimes  $\pm$  ovoid, 1-1.5(2.2) cm long, 0.3-0.5(0.7) cm diam. *Capitula* 20-80 per compound head; capitulum-subtending bract widely to widely depressed obovate or widely depressed ovate, (1.25)1.4-2.2(2.8) mm long, (1.65)1.8-3(3.3) mm wide; midrib entire, variably hairy or glabrous, sometimes with a few glandular hairs. *Capitular bracts* c. 4-10, c. 1.5 mm long and with the upper part of the laminae variably constricted, arranged in 1 or  $\pm$  2 whorls, the whorl or outer whorl of 2  $\pm$  concave bracts with distinctive midribs and 2 flat bracts with variably distinct midribs, the inner whorl of c. 3-5  $\pm$  flat to concave bracts with indistinct midribs. *Florets* (1)3-5(8); corolla 5-lobed, the tube with an abrupt taper in the lower  $\frac{1}{2}$ , 1-1.2 mm long, 0.3-0.4 mm diam., sometimes with a few glandular hairs on the tube; anthers 5, each with c. 300-450 pollen grains. *Achenes*  $\pm$  obovoid, 0.35-0.5 mm long, c. 0.3 mm diam., papillose, purplish. Pappus usually a small, jagged ring 0.1-0.2 mm high, sometimes with several apically divided bristles extending to c.  $\frac{1}{2}$  the height of the floret. Figs: 9; 10a-f.

Chromosome numbers:  $n=6$ .

DISTRIBUTION (See Short 1981a, fig. 4):

Southern and central Australia. Common.

#### ECOLOGY:

Found in both coastal and inland situations around claypans, saline depressions and granite outcrops or in scrubland, shrubland and hummock grassland formations. Collectors' notes include "Steppe with *Myriocephalus stuartii*, *Cassia eremophila*, mulga, chenopods", "On wide, low, red sandy ridge dominated by *Triodia mitchellii* var. *brevifolia*", "In *Acacia linophylla* association on red sand dunes", "Growing in upper *Arthrocnemum* [= *Halosarcia*] zone and extending to open areas between *Melaleuca* around salty depression. Sandy loam.", ". . . salt lake . . . as close as 3 m from salt line. Growing in sand. Assoc.spp.: *Atriplex vesicaria*, *Melaleuca halmaturorum*" and "Base of granite rocks in very sandy loam".

#### NOTES:

1. The specimen of *A. pusillus* var. *polyanthus* designated as the lectotype is the only specimen in K or MEL both seen by Bentham and with the correct annotation. It contains two specimens with what is considered to be a generalised locality, i.e. "Murray and Darling Desert". Several other specimens seen by Bentham (as indicated by the initial B on the label) and collected on the Victorian Expedition exist in MEL. None is annotated as var. *polyanthus* and none has exactly the same locality details but the possibility exists that some may be isolectotypes. The collections are *Anon* s.n., Vict. Expd., Near Darling R., 28.x.1860 (MEL 541204); *Anon* s.n., Darling Desert, s. dat. (MEL 541203); *Anon* s.n., Vict. Exped., Sand hills, 29.ix.1860 (MEL 84538); *Beckler* s.n., V. Exp., near R. Darling, 1860 (MEL 84537).

2. The specimen designated as the lectotype of *C. angianthoides* is the only one for which Cudnaka is mentioned in the locality details. The label also mentions Arkaba, the locality given on the isolectotype sheets MEL 541200 and MEL 541202. Specimens on the

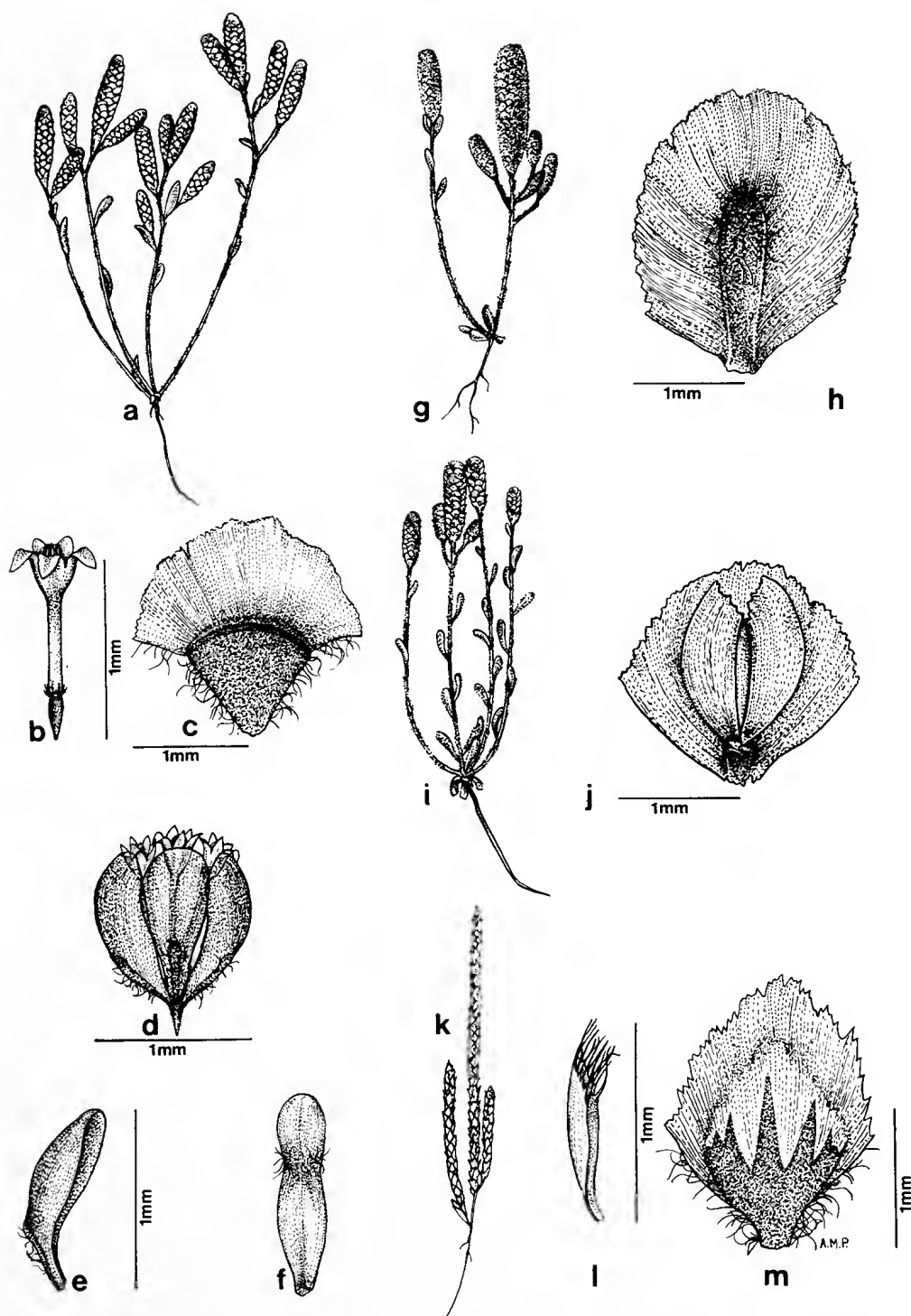


Fig. 10. Characteristics of *Chrysocoryne*. *C. pusilla*, a-f: a — habit, x 1, b — floret, c — capitulum-subtending bract, d — capitulum, e — outer concave capitular bract, f — inner flat capitular bract, (Short 902). *C. multiflora*, g-h: g — habit, x 1, h — capitulum-subtending bract, (Short 1046). *C. drummondii*, i-j: i — habit, x 1, j — inner view of capitular bracts and capitulum-subtending bract, (Short 1085). *C. trifida*, k-m: k — habit, x 1, l — capitular bract, m — capitulum-subtending bract, (Short 966).

former sheet are labelled "Arkaba. Dr. Ferd. Muller, *Chrysocoryne angianthoides* F. M." in O. W. Sonder's hand and below them, on a separate label, there are descriptive notes plus the locality details "Arkaba. N. Holl. austr. interiory" in Mueller's hand. It seems likely that the sheets MEL 514200-541202 contain specimens from the one gathering. A further collection, housed in GH and from Sonder's herbarium, is also clearly designated as coming from the Arkaba region and is also regarded as a probable islectotype.

Although only giving "Nov. Holl. austr. inter." as the locality MEL 84532 is also regarded as a probable islectotype. The sheet contains specimens which come from Sonder's herbarium and which match those on the lectotype sheet.

3. *C. pusilla* is an extremely polymorphic species exhibiting much variation in respect to the habit, the shape of the leaves and compound heads, pappus morphology and the number of bracts and florets per capitulum. Bentham (1867) recognised *A. pusillus* var. *polyanthus*, a taxon distinguished by having 3-6 florets in the upper capitula of a compound head whereas typical *C. pusilla* has only 2 or 3 florets. Floret number is however quite variable and the recognition of an infraspecific category on this character alone is not justifiable. At first glance a number of infraspecific taxa appear to be recognisable but variation is such that no single character appears to be constantly correlated with others, various combinations of characters occurring in different populations. Thus no infraspecific taxa are currently recognised.

#### SELECTED SPECIMENS EXAMINED (18/370):

*Western Australia* — Cleland s.n., Carnarvon, s. dat. (PERTH); Drummond 355, Swan River, 1844 (MEL); George 8414, 2 miles W. of Neale Junction, 10.x.1966 (PERTH); Keighery 423, Slopes of Mt. Ridley, 26.x.1975 (KP); Morrisons s.n., Carnamah, 2.xi.1906 (CANB 209963, BRI 144628, PERTH); Preiss 45, Swan River Colony, s. dat. (MEL); Short 464, c. 20 km N. of Gascoyne Junction, 24.viii.1977 (AD); Short 637, Southern margins of Lake Brown, 22.ix.1977 (AD); Short 658, Roe Dam, 23.ix.1977 (AD).

*Northern Territory* — Latz 1766, Petermann Ranges, 24.ix.1971 (AD, BRI, NT); Ising s.n., 10 miles south of Finke, 25.viii.1931 (AD 97420104).

*South Australia* — Crisp 646, Koonamore, 24.x.1973 (AD, CBG); Lang 996, c. 17.8 km SW. of Hiltaba homestead, 14.x.1977 (AD); Specht & Carrodus 93, 40 miles north Nonning homestead, 16.xi.1958 (AD).

*Victoria* — Beaughole 1090, Kulkyne National Forest, -x.1948 (ACB).

*New South Wales* — Lander 72, 12.8 km N. of Lake Wallace homestead, 26.ix.1971 (AD, NSW); McGillivray 2908, east of Narran Lake, near Brewarrina, 22.xi.1967 (BRI).

*Queensland* — Copley 3690, Naryilco Station, 3.x.1971 (AD).

## 2. *Chrysocoryne multiflora* Short, sp. nov.

*Chrysocoryne* sp. A, Short, Muelleria 4:402 (1981).

*Herba annua*, 2.5-4 cm alta. Axes maiores erecti, pilis glandulosis varie obtectis; caulis simplex vel e nodis basalibus superioribusque ramificans. *Folia* ad basem ? opposita, super alterna, linearia vel subelliptica vel oblanceolata usque obovata, 0.3-0.5(c. 0.7) cm longa, c. 0.1-0.2 cm lata, pilis peltiformibus dense obtecta. *Glomeruli* oblongi vel ita subanguste, c. 0.5-2 cm longi, c. 0.25-0.4(0.45) cm diametro. *Capitula* c. 50-250; bractea capitulum subtendens obovata sublate usque latissime subcircularisve, (1.8)2-2.6(2.85) mm longa, (1.35)1.7-2.2(2.4) mm lata marginibus interdum ciliatis, pilis c. 0.1-0.3 mm longis; costa integra, varie villosa et nonnullis pilis glandulosis peltiformibus. *Bractee intra capitulum* 2-4(c. 10), in capitulis plurimis 2 concavis bracteis, intra cas 1 vel 2 planis, et in capitulis basalibus nonnullis 6-10 concavis planisque 2 vel 3 subverticillatis consistentes; bractee concavae (1.2)1.4-1.65(1.75) mm longae, (0.35)0.5-0.75 mm latae, marginibus ciliatis pilis 0.1-0.3 mm longis, costa distincta, glabra pilosave; bractee planae 1-1.4 mm longae, (c. 0.05)0.3-0.6(0.8) mm latae, marginibus longe ciliatis, pilis c. 0.1-0.3 mm longis, costa parum clava, interdum ad basem pilos glandulosos paucos ferenti. *Flosculi* (2)3-5(6); corolla 3-5-lobatae; antherae 3-5, inaequaeque pollinibus c. 15-40. *Achenia* ± obovoidea, c. 0.4 mm longa, 0.35 diametro, purpurea. *Pappus* carens.

**HOLOTYPE** (fig. 11): *Chinnock 4411 & Wilson*, Mortlock river just east of Meckering. (31°37'S, 117°05'E). Growing on sandy rises with *Angianthus*, *Stipa* sp. *Hakea*/*Melaleuca* scrubland, 22.xi.1978 (AD 98002346). **ISOTYPE**: PERTH.

*Annual herb*, 2.5-4 cm high. Major axes erect, with scale-like glandular hairs; stem simple or forming major branches at basal and upper nodes. *Leaves* ? opposite at the base, the upper ones alternate, ± elliptic or oblanceolate to obovate, sometimes ± linear, 0.3-0.5(0.7) cm long, c. 0.1-0.2 mm wide, a small hyaline appendage sometimes present at the apex, all leaves densely covered in scale-like glandular hairs. *Compound*



*heads* ± narrowly oblong to oblong, c. 0.5-2 cm long, c. 0.25-0.4(0.45) cm diam. *Capitula* c. 50-250 per compound head; capitulum-subtending bract ± widely to ± very widely obovate, sometimes ± circular, (1.8)2-2.6(2.85) mm long, (1.35)1.7-2.2(2.4) mm wide, the margins sometimes ciliate, the hairs c. 0.1-0.3 mm long; midrib entire, variably villous and with a few scale-like glandular hairs. *Capitular bracts* 2-4(c. 10); the majority of capitula with 2 concave bracts, (1.2)1.4-1.65(1.75) mm long, (0.35)0.5-0.75 mm wide, with ciliate margins, the hairs c. 0.1-0.3 mm long, with a conspicuous glabrous or hairy midrib extending c.  $\frac{2}{3}$ - $\frac{3}{4}$  the length of the bract, 1 or 2 flat bracts commonly occur within the concave bracts, the bracts 1-1.4 mm long, (c. 0.05)0.3-0.6(0.8) mm wide, with distinctly divided margins in the upper  $\frac{3}{4}$  of the bract, the hairs c. 0.1-0.3 mm long, the midrib ± inconspicuous and sometimes with a few glandular hairs at the base; a few basal capitula often with 6-10 concave and flat bracts arranged in ± 2 or 3 whorls, the bracts resembling those of the upper capitula. *Florets* (2)3-5(6) per capitulum; corolla 3, 4 or 5-lobed, the tube tapering ± gradually to a thickened base, c. 0.6-0.7 mm long, c. 0.2-0.35 mm diam., often with a few glandular hairs along the tube; anthers 3, 4 or 5, each with c. 15-40 pollen grains. *Achenes* ± obovoid, c. 0.4 mm long, 0.35 mm diam., purplish. Pappus absent. Figs: 9; 10g-h; 11.

Chromosome no.:  $n = c. 12$ .

DISTRIBUTION (See Short 1981a, fig. 4):

South-west of Western Australia. Apparently confined to salt lakes of the Avon drainage system. Locally common.

ECOLOGY:

Grows in saline sandy soils on the margins of salt lakes. Commonly associated with *Melaleuca* and *Halosarcia* spp.

NOTES:

1. The specific epithet alludes to the many-flowered capitula in this species. Other inbreeding species, and usually the outbreeding *C. pusilla* as well, have fewer florets per capitulum.

2. The number and arrangement of capitular bracts is variable within any single compound head. In some compound heads examined there appears to be a trend from c. 6-10 bracts per capitulum at the base of the heads to 2 bracts per capitulum toward the apex. The majority of capitula have 2 distinctly concave bracts within which 1 or 2 further flat bracts may occur. When 2 inner bracts occur there is often a distinct difference in size and it is common to see bracts no more than 4 or 5 cells wide.

SPECIMENS EXAMINED:

*Western Australia* — Chinnock 4364, Western edge of Lake King, 12.xi.1978 (AD, PERTH); Keighery 1337, W'n edge of Lake King, 8.x.1974 (KP); Short 1046, c. 4.6 km E. of Meckering in East Branch of Mortlock River, 20.xi.1979 (AD).

3. *Chrysocoryne drummondii* A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:152 (1851). TYPE: "Swan River, Drummond". LECTOTYPE (here designated): *Drummond 16*, Swan River, s. dat. (K). SYNTYPES OR POSSIBLE ISOLECTOTYPES: K, MEL 541601, MEL 84756 (see note 1 below).

*Chrysocoryne tenella* F. Muell., Trans & Proc. Vict. Inst. Advancem. Sci. 130 (1855); F. Muell., Hook. J. Bot. Kew Gard. Misc. 8:149 (1856). — *Angianthus tenellus* (F. Muell.) Benth., Fl. Austr. 3:564 (1867); J. M. Black, Fl. S. Aust. 1st. ed. 646 (1929), 2nd. ed. 925 (1957); Willis, Handb. Pl. Vict. 2:730 (1973); Grieve & Blackall, W. Aust. Wildfls 813 (1975). — *Stylancerus tenellus* (F. Muell.) Kuntze, Rev. Generum Pl. 367 (1891). — *Siloxerus tenellus* (F. Muell.) Ostenf., Biol. Meddel. Kongel. Danske Vidensk. Selsk. 3:138 (1921), *nom. illeg.* TYPE: "In flats subject to inundations by winter rains, between the Long Lake and the Fountain, on Spencer's Gulf. C. Wilhelmi." LECTOTYPE (here designated): *Wilhelmi* s.n., between the Fountain & Long Lake, s. dat. (K). PROBABLE ISOLECTOTYPE OR SYNTYPE: MEL 541620 (see note 2 below).

[*Crossolepis pusilla* auct. non Benth.: Hook., Ic. Pl. 5: t. 413 (1841) (see note under generic treatment of *Chrysocoryne*).]



[*Chrysocoryne pusilla* auct. non (Benth.) Endl.: Endl., Bot. Zeitung (Berlin) 1:457 (1843) (see note under generic treatment of *Chrysocoryne*).]

*Annual herb*, 3-5(c. 6) cm high. Major axes erect with scale-like glandular hairs; stem simple or forming major branches at basal and/or upper nodes. *Leaves* opposite at the base, the upper ones alternate, all leaves  $\pm$  oblanceolate to obovate or narrowly elliptic to elliptic, 0.2-0.8(1.1) cm long, 0.04-0.08(c. 0.1) cm wide, a small hyaline appendage sometimes present at the apex, all leaves densely covered in scale-like glandular hairs. *Compound heads* narrowly oblong, c. 0.5-2(2.5) cm long, c. 0.2-0.25(0.35) cm diam., with a single head occurring at the apex of an unbranched major axis or several occurring on minor axes which branch from the upper nodes of a major axis. *Capitula* c. 40-150 per compound head; capitulum-subtending bracts widely elliptic to  $\pm$  oblate or widely ovate to widely depressed ovate, (1.65)1.7-2.1(2.25) mm long, (1.8)2-2.5(2.65) mm wide; midrib entire, variably hairy, often with a few scale-like glandular hairs. *Capitular bracts* 2, concave, (1.2)1.3-1.65 mm long, 0.5-0.85 mm wide, the upper margins variably ciliate, the hairs c. 0.1 mm long; midrib inconspicuous. *Florets* (1)2(4) per capitulum; corolla 3, 4 (5)-lobed, the tube tapering  $\pm$  gradually to a thickened base, 0.65-0.8 mm long, 0.25-0.35 mm diam., sometimes with a few glandular hairs on the lower  $\frac{1}{2}$ ; anthers 3, 4 (5), each with c. 20-60 pollen grains. *Achenes*  $\pm$  obovoid, 0.4-c. 0.5 mm long, 0.25-c. 0.3 mm diam., papillose, purplish. Pappus absent.

Figs: 9; 10i-j.

Chromosome number: not known.

DISTRIBUTION (See Short 1981a, fig. 4):

South-west Western Australia, southern South Australia and south-west Victoria. Locally common.

#### ECOLOGY:

Found in both coastal and inland situations around salty depressions and granite outcrops or in open woodland. Collectors' notes include "Open sites between shrubs, in Wandoo woodland or in shrubby areas", "In open woodland with *Eucalyptus cladocalyx* as dominant. Greyish sand.", "Growing in granitic depressions with very small annual grasses, composites etc. Sandy loam", "Growing on white to greyish sand amongst *Carpobrotus*, *Arthrocnemum* [= *Halosarcia*] & *Melaleuca*" and "Near sea on granite rock".

#### NOTES:

1. Gray (1851) realised that a figure published by W. J. Hooker in *Icones Plantarum* and referred to as *Crossolepis pusilla* was in fact not of that species. Consequently he referred the figure and specimens collected by Drummond to *Chrysocoryne drummondii*. In their publications both Gray and Hooker failed to indicate Drummond's collection number for specimens from the Swan River.

At K there is a single sheet bearing apparently two distinct collections. The upper part of the sheet contains specimens and the label, "*Crossolepis pusilla*. Hugel. Swan River, 16, *Drummond*". The label appears to be in Hooker's hand. The lower part of the sheet contains specimens clearly designated as "*Chrysocoryne Drummondii* Gray". This label appears to be in Gray's hand. The original drawings of '*Crossolepis pusilla*' published in *Icones Plantarum* are attached to the left hand side of the sheet. From Gray's information there seems no reason to assume that he did not examine the upper specimens and in any case it would appear that they are the ones used by Hooker in his illustration which was directly referred to by Gray. Thus the *Drummond 16* collection has been designated as the lectotype. The lower most collection is regarded as a syntype or, in the event that the specimens are from the one gathering, as an isolectotype.

Specimens in MEL, i.e. MEL 541601 with the label "W. A., J. Dr." and MEL 84756 (ex herb. O. W. Sonder) with the label "*Chrysocoryne Drummondii* A. Gray, Swan River-Drummond 1844. n.356", are also considered to be syntypes or, as in the former case a possible isolectotype, because of the lack of, or Gray's failure to cite, a collector's number.

2. The only Wilhelm collection of *C. tenella* accompanied by locality information

which agrees precisely with Mueller's type citation is in K. The accompanying label indicates that the specimens were seen by Mueller and this sheet is selected as the lectotype. Although not correctly designated a further collection, MEL 541620 with the label "*Chrysocoryne tenella* Ferd. Muller, Port Lincoln, Wilhelmi" is probably an isolectotype or syntype. In Mueller's case it is not uncommon to find that collection details accompanying specimens do not agree entirely with the published information. In this case there would appear to be a major discrepancy in the locality details but similar labels have been found on possible type material of *Pleuropappus phyllocalymmeus*.

3. Despite its wide distribution *C. drummondii* exhibits little morphological variation although floret number has been observed to differ in some collections. Most collections have 2-flowered capitula but some collections with 3- and/or 4-flowered capitula (e.g. *Cronin* MEL 84705) and apparently 1-flowered capitula (e.g. *Andrews*, PERTH s.n.) have been found in Western Australia. A further collection, *Eichler* 20312, also from Western Australia, contains specimens with longer, narrower compound heads than those normally found in the species but other attributes suggest that it is best referred to *C. drummondii*.

#### SELECTED SPECIMENS EXAMINED (9/73):

*Western Australia* — *Andrews* s.n., Cannington, -x.1902 (PERTH); *Burbidge* 7892, Dryandra State Forest, 22.xii.1971 (CANB, PERTH); *Short* 943, Yorkrakine Granite Rocks, 13.xi.1979 (AD); *Short* 1085, c. 8.6 km W. of Lake Grace, 24.xi.1979 (AD); *Short* 1110, western margins of Lake Gilmere, 26.xi.1979 (AD); *Wilson* 10,009, c. 1 km W. of Lucky Bay, 30.ix.1970 (PERTH).

*South Australia* — *Hunt* 414, c. 25 km north-west of Naracoorte, 18.xi.1961 (AD); *Short* 807, c. 15.2 km from Edillilie along main road to Pt. Lincoln, 26.ix.1978 (AD).

*Victoria* — *Phillips* 406, between Apsley & Booroopki, 2.xi.1971 (CBG).

#### 4. *Chrysocoryne trifida* Short, sp. nov.

*Chrysocoryne* sp. B, Short, *Muelleria* 4:402 (1981).

*Herba annua*, (2)3-7 cm alta. Axes maiores ascendentes erective pilos peltiformes glandulosus ferentes; caulis interdum simplex sed plerumque ex nodis basalibus superioribusve vel ubique ramificans; ramuli maiores ipsi saepe surculos efficientes. *Folia* alterna, plerumque anguste elliptica oblanceolata, raro elliptica, 0.2-0.8 cm longa, c. 0.1-0.2 cm lata, pilos glandulosus peltiformes ferentia. *Glomeruli* cylindracei usque anguste oblongi, 1-c. 4 cm longi, 0.1-0.2 cm diametro. *Capitula* c. 30-100; bractea capitulum subtendens  $\pm$  late elliptica obovatave, 1.6-2.2 mm longa, 1.4-1.9 mm lata; costa varie pilosa, saltem 3 lobis distinctis. *Bractee intra capitulum* 2, concavae, 0.8-1.3 mm longae, 0.2-0.3 mm latae, marginibus superioribus pilis c. 0.5 mm longis; costa conspicua, circa dimidium longitudinis bractee attingens, glabra. *Flosculi* 1(2); corolla 5-lobata; antherae 5, unaquaque pollinibus c. 350-500. *Achenia*  $\pm$  obovoidea, c. 0.3-0.4 mm longa, c. 0.2-0.3 mm diametro, papillosa, purpurea. Pappus carens.

**HOLOTYPE** (fig. 12): *Short* 966, 45.1 km N. of Koorda along main road to Mollerin. Salt lake. c. 30°28'S, 117°31'E. Growing in white to brown sand or very sandy loam amongst *Melaleuca*, just above *Arthrocnemum* [= *Halosarcia*] zone. *Chrysocoryne tridens* and *C. trifida* commonly found growing together, 14.xi.1979 (AD 98002348). **ISOTYPE**: PERTH.

*Annual herb*, 3-7 cm high. Major axes ascending or erect, with scale-like glandular hairs; stem sometimes simple but usually forming major branches at basal and/or upper nodes. *Leaves* alternate, narrowly elliptic or oblanceolate, rarely elliptic, 0.2-0.8 cm long, c. 0.1-0.2 cm wide, a small hyaline appendage often present at the apex, all leaves with scale-like glandular hairs. *Compound heads* cylindrical to narrowly oblong, 1-4 cm long, 0.1-0.2 cm diam. *Capitula* c. 30-100 per compound head; capitulum-subtending bracts  $\pm$  widely elliptic or  $\pm$  widely obovate, 1.6-2.2 mm long, 1.4-1.9 mm wide; midrib with at least 3 distinct lobes, variably hairy, at least the lower bracts with some scale-like glandular hairs. *Capitular bracts* 2, concave, 0.8-1.3 mm long, 0.2-0.3 mm wide, the upper margins with long hairs  $\frac{1}{3}$ - $\frac{1}{2}$  (c. 0.5 mm long) the length of the bract; the midrib conspicuous and c.  $\frac{1}{2}$  the length of the bract, glabrous. *Florets* 1(2); corolla 5-lobed, the tube tapering  $\pm$  gradually to the base or with a fairly distinct constriction in the lower  $\frac{1}{2}$ , the entire tube 0.8-1 mm long, c. 0.3-0.4 mm diam.; anthers 5, each with c. 350-500 pollen grains. *Achenes*  $\pm$  obovoid, 0.3-0.4 mm long, c. 0.2-0.3 mm diam., papillose, purplish. Pappus absent. Figs: 9; 10k-m; 12.

Chromosome number:  $n = c. 11$ .

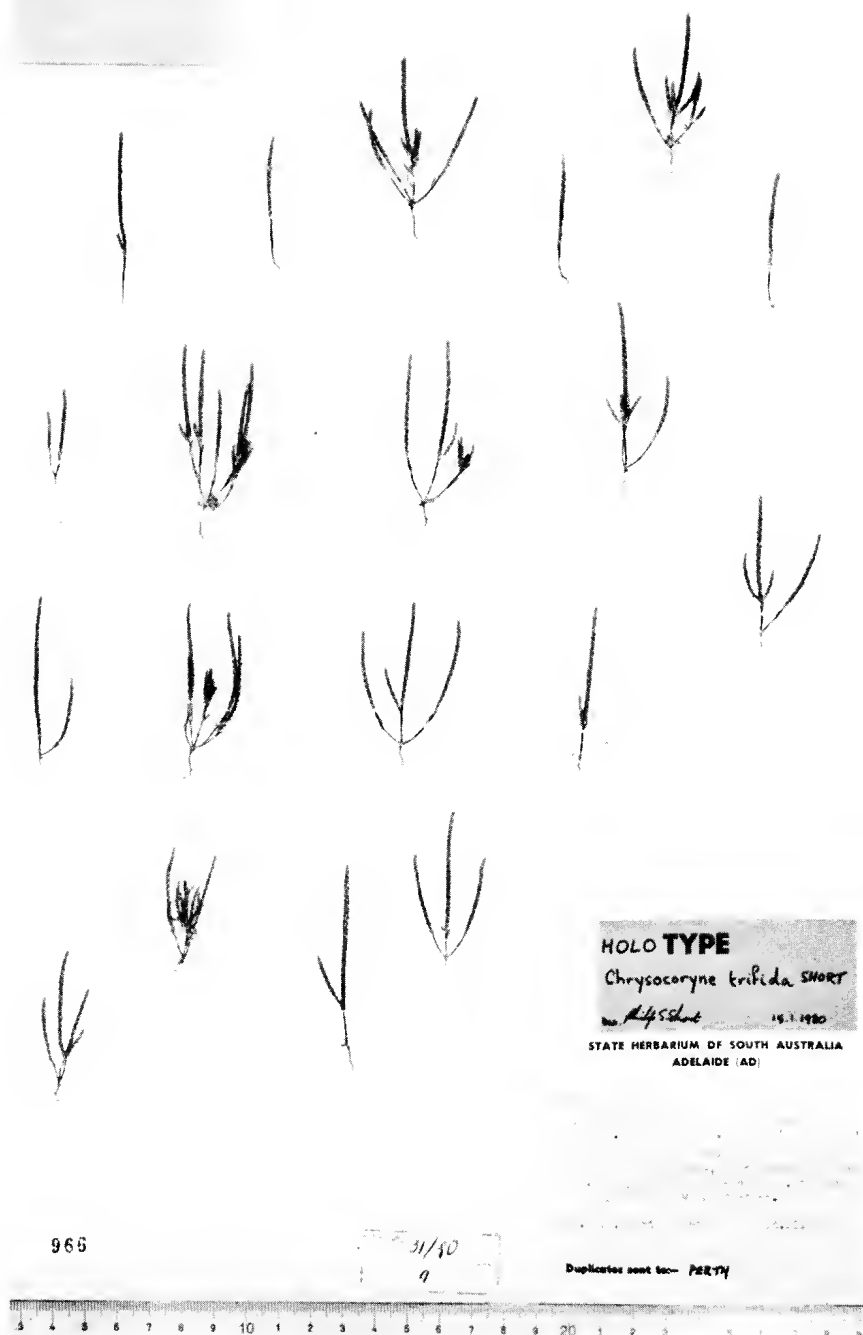


Fig. 12. *C. trifida* Short. Holotype (Short 966, AD).

DISTRIBUTION (See Short 1981a, fig. 4):

Western Australia, occurring on salt lakes in both the Eucla and South West Drainage Divisions. Locally common.

ECOLOGY:

Restricted to saline depressions. Collectors' notes include "... west side of lake. Sandy edge of clay pan" and "Brown sand to very sandy loam. Very common amongst *Arthrocnemum* [= *Halosarcia*]"

NOTES:

1. The specific epithet alludes to the conspicuous, generally trifid midrib of the capitulum-subtending bracts.

SPECIMENS EXAMINED:

Western Australia — Short 989, saline depression 34.5 km N. of Perenjori, 15.xi.1979 (AD); Wilson 6083, near Mollerin, 2.ix.1967 (PERTH); Wilson 8813, Lake Barlee, southern margin, 25.viii.1970 (PERTH); Wilson 8853, near Lake Barlee HS on west side of Lake, 26.viii.1970 (PERTH).

5. *Chrysocoryne uniflora* Turcz., Bull. Soc. Naturalistes Moscou 24 (1):188 (March 1851). TYPE: "Nova Hollandia. Drum coll. 111. n.116." POSSIBLE HOLOTYPE: KW (see p.152). ISOTYPES: GH (ex herb. Klatt), K, MEL 541599, NSW. POSSIBLE ISOTYPES: GH, K, MEL 84468, MEL 541598, MEL 541600 (all collections by Drummond but lack collector's number).

*Chrysocoryne myosuroides* A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:152 (May 1851). — *Angianthus myosuroides* (A. Gray) Benth., Fl. Austr. 3:563 (1867); Hoffman in Engler & Prantl, Naturl. Pflanzenfam. IV (5):194, fig. 98B (1890); Grieve & Blackall, W. Aust. Wildfls 813 (1975), ?p.p. (as to mixed collns of *C. tridens* & *C. uniflora* in PERTH). — *Stylancerus myosuroides* (A. Gray) Kuntze, Rev. Generum Pl. 367 (1891) ('*myosuroides*'). TYPE: "Swan River, Drummond, 1845." LECTOTYPE (here designated): Drummond 116, Sw.riv., 1845 (K) (see note 1 below). ISOLECTOTYPES: GH (ex herb. Klatt), MEL 541599, NSW. POSSIBLE ISOLECTOTYPES: K, MEL 84468, MEL 541598, MEL 541600, GH (all collections by Drummond but lack collector's number).

Annual herb, 4-8(c. 14) cm high. Major axes erect, with scale-like glandular hairs; stem rarely simple, usually forming major branches at basal and/or upper nodes. Leaves opposite at the base, the upper ones alternate, all leaves narrowly elliptic to ± elliptic, oblanceolate to obovate or ± lanceolate, 0.2-0.5(0.8) cm long, c. 0.05-0.2 cm wide, a small hyaline appendage sometimes present at the apex, all leaves densely covered in scale-like glandular hairs. Compound heads cylindrical to narrowly oblong, c. 1.5-3.5(4.4) cm long, 0.15-0.2(0.25) cm diam., with a single head occurring at the apex of an unbranched major axis or with (2)4-10(14) heads occurring on minor axes which branch from the upper nodes of a major axis. Capitula c. 50-150 per compound head; capitulum-subtending bracts ± widely elliptic or widely obovate to depressed widely obovate, 1.7-2.05 mm long, 1.75-2.05 mm wide; midrib entire, glabrous or variably villous, sometimes with a few scale-like glandular hairs. Capitular bracts 2, concave, 1.4-1.8 mm long, 0.4-0.7 mm wide, the upper margins variably ciliate, the hairs less than c. 0.1 mm long; midrib not conspicuous. Florets 1 or 2 per capitulum, the upper most capitula of a compound head with 1 floret, the lower ones usually with 2 florets; corolla 5-lobed, the tube tapering gradually to a thickened base, 0.75-1 mm long, 0.23-0.4 mm diam.; anthers 5, each with c. 250-350 pollen grains. Achenes ± obovoid, 0.4-0.5 mm long, 0.25-c. 0.35 mm diam., papillose, purplish. Pappus absent. Fig. 9.

Chromosome number: not known.

DISTRIBUTION (See Short 1981a, fig. 4):

South-west of Western Australia. Salt lakes of the Murchison and South West Drainage Divisions. Locally common.

ECOLOGY:

Restricted to the margins of saline depressions. Grows in sand or sandy loam and associated with *Halosarcia* spp. and *Melaleuca*.

## NOTE:

1. The K sheet designated as having the lectotype collection of *C. myosuroides* also contains further specimens of the same species. The specimens are accompanied by the label "*Chrysocoryne*, Sw. riv., Drummond". In the bottom right hand corner of the sheet there is also a label "*Chrysocoryne myosuroides*, Gray" which appears to be in Gray's hand. It is possible that both sets of specimens were seen by Gray and furthermore both sets may be from the one gathering.

## SELECTED SPECIMENS EXAMINED (4/20):

*Western Australia* — *Short 614A*, c. 3.4 km E. of Meckering in Mortlock River, 20.ix.1977 (AD); *Short 986*, 7.9 km N. of Latham, 15.xi.1979 (AD); *Short 991*, c. 30.4 km S. of Pindar, 15.xi.1979 (AD); *Short 1014*, c. 54.5 km from Nugadong along main road to Guniyidi, 19.xi.1979 (AD).

6. *Chrysocoryne tridens* Short, sp. nov.

*Chrysocoryne* sp. C, Short, *Muelleria* 4:402 (1981).

*Herba annua*, 3-6(7.6) cm alta. Axes maiores erecti, nonnullis pilis glandulosis peltiformibus; caulis simplex vel e nodis basalibus ramificans. *Folia* ad basem opposita, superiora alterna, omnia linearia elliptica vel oblanceolata usque obovata, 0.3-0.8 cm long, 0.05-0.1 cm lata, pilis glandulosis peltiformibus dense oblecta. *Glomeruli* cylindracei usque anguste oblongi, (c. 1)3-5(6.3) cm longi, 0.15-0.2 cm diametro. *Capitula* c. 50-250; bractea capitulum subtendens late elliptica vel late obovata, 1.7-2(2.2) mm longa, (1.45)1.6-2 mm lata; costa integra, glabra vel varie pilosa, saepe pilis glandulosis pelti formibus nonnullis. *Bractae intra capitulum* 2, concavae, 0.9-1.4 mm longae, 0.35-0.6 mm latae, marginibus superioribus varie ciliatis, pilis usque ad c. 0.1 mm longis; costa parum clara. *Flosculi* 1; corolla 3-lobata, antherae 3, unaquaeque pollinibus c. 8-28. *Achenia* obovoidea, 0.45-0.55 mm longa, 0.15-0.23 mm diametro, papillosa, purpurea. Pappus carens.

**HOLOTYPE** (fig. 13): *Short 1041*, c. 3.5 km E. of Meckering in Mortlock River flats (East Branch). c. 31°37'S, 117°02'E. Growing in whitish brown sand to very sandy brown loam amongst *Arthrocnemum* [= *Halosarcia*], *Acacia* and other shrubs. V. common, 20.xi.1979 (AD 98002347). **ISOTYPE**: CANB, PERTH.

*Annual herb*, 3-6(7.6) cm high. Major axes erect, with scale-like glandular hairs; stem simple or forming branches at basal nodes, never branching from upper nodes. *Leaves* opposite at the base, the upper ones alternate, all leaves linear or elliptic or oblanceolate to obovate, 0.3-0.8 cm long, 0.05-0.1 cm wide, a small hyaline appendage sometimes present at the apex, all leaves densely covered with scale-like glandular hairs. *Compound heads* cylindrical to narrowly oblong, (c. 1)3-5(6.3) cm long, 0.15-0.2 cm diam., with only a single head occurring at the apex of an unbranched major axis. *Capitula* c. 50-250 per compound head; capitulum-subtending bracts widely elliptic or widely obovate, 1.7-2(2.2) mm long, (1.45)1.6-2 mm wide; midrib entire, variably hairy or glabrous, often with a few scale-like glandular hairs. *Capitular bracts* 2, concave, 0.9-1.4 mm long, 0.35-0.6 mm wide, the upper margins variably ciliate, the hairs less than c. 0.1 mm long; midrib inconspicuous. *Florets* 1 per capitulum; corolla 3(4)-lobed, the tube tapering ± gradually to a thickened base, 0.7-0.85 mm long, 0.15-0.23 mm diam.; anthers 3(4), each with c. 8-28 pollen grains. *Achenes* ± obovoid, 0.45-0.55 mm long, 0.3-0.35 mm diam., papillose, purplish. Pappus absent.

Figs: 9; 13.

Chromosome number:  $n = c. 13$ .

## DISTRIBUTION (See Short 1981a, fig. 4):

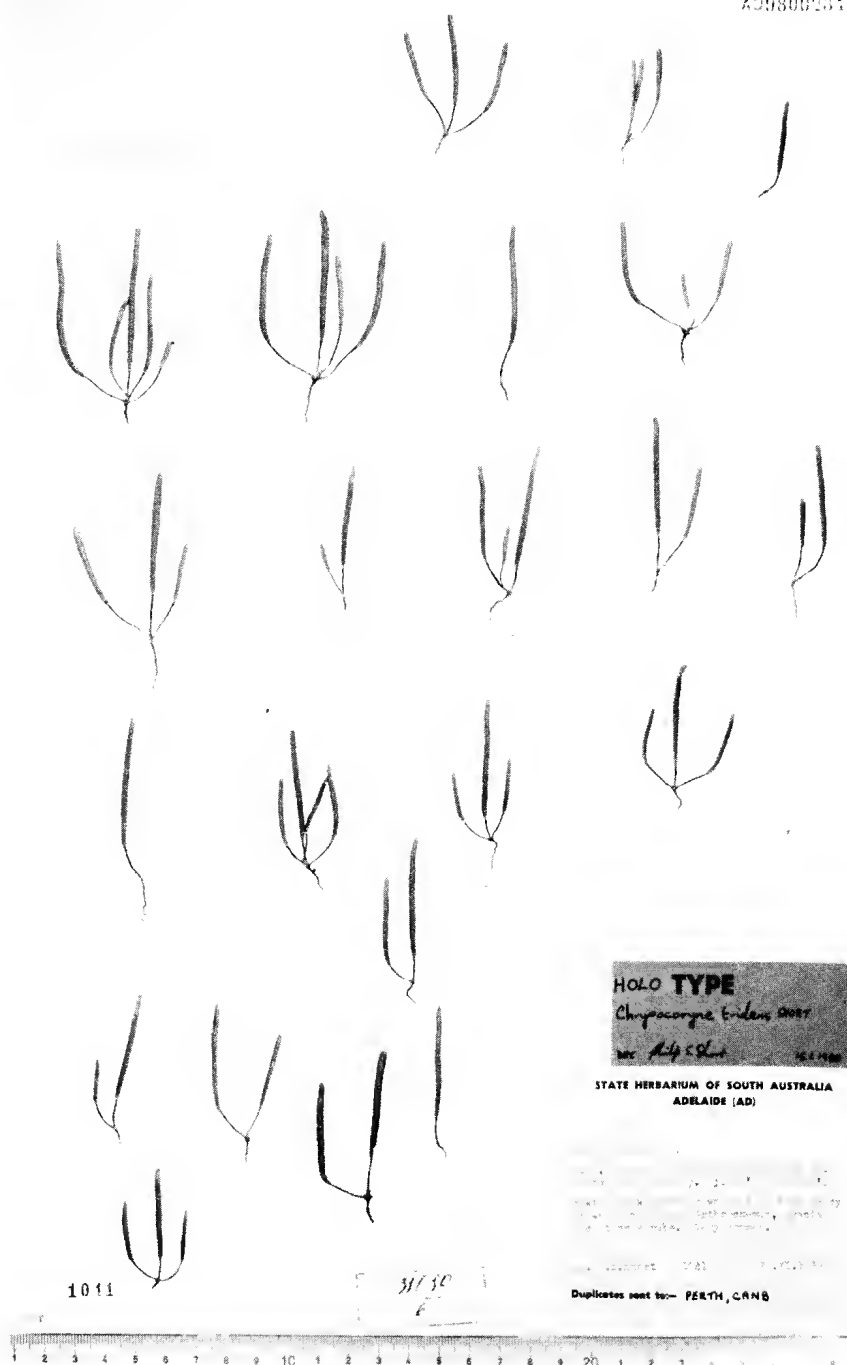
South-west of Western Australia. Salt lakes of the Eucla and South West Divisions. Locally common.

## ECOLOGY:

Restricted to the margins of saline depressions. Collectors' notes include "Clay loam on edge of salty flats . . . forming large mats on the ground", "Growing amongst *Eucalyptus*, *Melaleuca* surrounding margin of salty depression. Sandy loam" and "Salt depression. White-greyish sand between *Melaleuca*".

*C. tridens* commonly grows with *C. uniflora*. Examination of collections, e.g. *Short 614A* & *614B*, has shown that the former species flowers some days before *C. uniflora*.

A59800231

Fig. 13. *C. tridens* Short. Holotype (Short 1041, AD).



## NOTE:

1. The specific epithet alludes to the 3-lobed florets generally found in this species.

## SELECTED SPECIMENS EXAMINED (5/30):

Western Australia — *Short 614B*, c. 3.4 km E. of Meckering in Mortlock River, 20.ix.1977 (AD); *Short 675*, 1 km E. of Wave Rock, 25.ix.1977 (AD); *Short 972*, southern edge of Lake Moore, 14.xi.1977 (AD); *Short 1063*, Beaufort Bridge along Kojonup-Williams road, 23.xi.1979 (AD); *Short 1113*, base of Dundas Rocks, 26.xi.1979 (AD).

6. ***Dithyrostegia*** A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:97,100 (April 1851). TYPE: *D. amplexicaulis* A. Gray.

*Gamozygis* Turcz., Bull. Soc. Naturalistes Moscou 24(2):75 (Oct. 1851). TYPE: *G. flexuosa* Turcz. (= *D. amplexicaulis* A. Gray).

[*Angianthus* auct. non Wendl.: see synonymy of *D. amplexicaulis*.]

[*Styloncerus* auct. non Spreng., *nom. illeg.*: see synonymy of *D. amplexicaulis*.]

*Annual herb*. Major axes erect or ascending, glabrous; stem simple or forming major branches at basal and/or upper nodes. *Leaves* alternate, sessile, ovate, concave, stem-clasping, glabrous. *Compound heads* broadly obovoid; bracts subtending compound heads 2, leaf-like, overlapping or connate in the lower  $\frac{1}{3}$ - $\frac{1}{2}$  and enclosing the compound head, glabrous. *General receptacle* a slightly expanded axis, in the largest heads  $\pm$  oblong, the capitula  $\pm$  evenly distributed over the surface, the entire receptacle densely covered with hairs which are c. the length of the florets. *Capitula* c. 10-40 per compound head. *Capitular bracts* 1 or 2, hyaline, if 2 then often partially connate, usually with long hairs at the apex, the entire part of the bracts only slightly exceeding the length of the achene. *Florets* 1 per capitulum; corolla 5-lobed; style branches truncate; stamens 5, with tailed anthers. *Achenes*  $\pm$  obovoid, densely silky hairy. Pappus of a few short, smooth bristles fused at the base, c.  $\frac{1}{5}$  the length of the corolla tube. Fig. 1g.

## DISTRIBUTION (Fig. 14):

A monotypic genus occurring in the south-west of Western Australia between latitudes c. 29°-31°S and west of longitude c. 120°E.

## AFFINITIES/GENERIC CHARACTERISTICS:

*Dithyrostegia* has no obvious affinities with other segregate genera of *Angianthus*. It is readily distinguished by the 2 leaf-like bracts which subtend the compound heads, the silky hairy achenes, capitular bracts and the concave, stem-clasping leaves.

## EVOLUTION/REPRODUCTIVE BIOLOGY:

A pollen-ovule ratio of 1,449 was determined from a single individual of *Short 344*. In keeping with values previously outlined the single species is probably an outbreeder (Short 1981a, b).

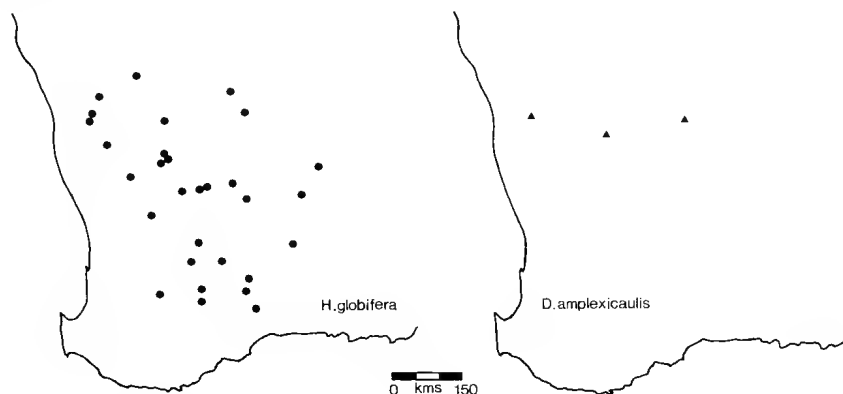


Fig. 14. Distribution of *Dithyrostegia amplexicaulis* and *Hyalochlamys globifera* (Western Australia).

**Dithyrostegia amplexicaulis** A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:100 (April 1851). — *Angianthus amplexicaulis* (A. Gray) Benth., Fl. Austr. 3:568 (1867); Grieve & Blackall, W. Aust. Wildfls 816 (1975). — *Styloncerus amplexicaulis* (A. Gray) Kuntze, Rev. Generum Pl. 367 (1891). TYPE: "South-western Australia, Drummond, 1850." LECTOTYPE (here designated): *Drummond* 57, S.W. Australia, 1850 (K), (see note 1 below). ISOLECTOTYPES: GH (ex herb. Klatt), MEL 541220, NSW, PERTH (2 sheets).

*Gamozygis flexuosa* Turcz., Bull. Soc. Naturalistes Moscou 24(2):76, t.1 (Oct. 1851). TYPE: "Nova Hollandia. Drum. V.n.57." HOLOTYPE: ?CW, n.v. (see p.152). ISOTYPES: GH (ex herb. Klatt), K, MEL 541220, NSW, PERTH (2 sheets).

*Annual herb*, 3-10(16) cm high. *Leaves* 0.5-1.5(1.8) cm long, 0.1-0.5 cm wide. *Compound heads* c. 0.5-1 cm long, c. 0.3-0.8 cm diam.; bracts subtending compound heads c.0.3-0.7 cm long, c. 0.4-0.8 cm wide. *Florets* 1; corolla 5-lobed, the lower ½ of the tube tapering abruptly to the base, c. 1.2-2 mm long, c. 0.4-0.5 mm diam.; anthers 5, each with c. 300 pollen grains. *Achenes* ± obovoid, c. 2 mm long, c. 1 mm diam., densely silky hairy.

DISTRIBUTION: See generic treatment.

#### ECOLOGY:

Only 2 collections of this species provide habitat notes. They are "Large saline depression . . . very common in upper *Arthrocnemum* [= *Halosarcia*] zone, around base of bushes" and "Growing in loam on slightly raised soil near edge of salt lake".

#### NOTES:

1. The lectotype sheet of *D. amplexicaulis* bears 8 individual specimens plus original drawings of the species. According to Gray (1851) the species was to be illustrated in *Icones Plantarum* but this did not eventuate.

2. A single collection, *Evans s.n.*, PERTH, from Yuin Station contains 4 plants which differ from typical *D. amplexicaulis*. They are dichotomously branched, have smaller leaves and compound heads, a less woolly general receptacle and the capitular bracts lack long hairs. The collection probably represents a distinct taxon but further collections are required to substantiate this view.

#### SPECIMENS EXAMINED:

*Western Australia* — *Drummond s.n.*, W.A., s.dat. (PERTH); *Short 344*, c. 12 km from Carnamah on Three Springs road, 15.viii.1977 (AD); *Wilson 6088k*, 28 km N. of Cleary, 2.ix.1967 (PERTH); *Wilson 8813a*, southern margin of Lake Barlee, 25.viii.1970 (AD, PERTH).

**7. *Hyalochlamys* A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:98, 101 (April 1851). TYPE: *Hyalochlamys globifera* A. Gray.**

[*Angianthus* auct. non Wendl.: various Australian floras, see synonymy of *H. globifera*.]

[*Styloncerus* auct. non Spreng., *nom. illeg.*: see synonymy of *H. globifera*.]

*Annual herb*. Major axes prostrate with scale-like glandular hairs; stem simple or forming major branches from basal nodes. *Leaves* in a basal rosette, sessile, entire, ± oblanceolate to obovate or spatulate, glandular hairy. *Compound heads* ± spheroid or ± broadly depressed ovoid; bracts subtending compound heads forming a conspicuous, multi-seriate involucre c. the length of the head; outer bracts with leaf-like midribs extending above the broad, wing-like, hyaline margins, the lower section of the midrib with long hairs, the upper section glandular hairy; inner bracts similar to the outer ones but the midrib c. at or below the level of the hyaline margins; *general receptacle* ± very broadly obovoid. *Capitula* c. 5-20 per compound head, each capitulum with a single subtending bract ± resembling the inner bracts of the general involucre but the midrib usually more rigid with a ± acute, often pink, hyaline apex as well as hyaline margins. *Capitular bracts* 3(?4), arranged so that 2 outer concave bracts surround 1(?) smaller, inner concave bract; outer concave bracts opaque, rigid, with narrow hyaline margins; the margins with long hairs, the apex with short, flattened hairs; inner bract c. the length or slightly exceeding the length of the achene, hyaline, lacking a distinct midrib and with

long hairs on the upper margins. *Florets* 1 per capitulum; corolla (4)5-lobed; style branches truncate; stamens (4)5, with tailed anthers. *Achene*  $\pm$  obpyriform, with a distinct, whitish carpodium, the entire fruit pinkish-brown, smooth. Pappus absent. Fig. 1f.

#### DISTRIBUTION (Fig. 14):

A monotypic genus restricted to the south-west of Western Australia between latitudes c. 29°S and c. 34°S and west of longitude c. 122°E.

#### AFFINITIES/GENERIC CHARACTERISTICS:

The affinities of this genus are obscure. It has no obvious relationships with other members of *Angianthus* s.l.

*Hyalochlamys* is readily distinguished from other members of *Angianthus* s.l. by the unique morphology of the bracts of both the general involucre and the capitula and the achene morphology. The presence of scale-like glandular hairs on the leaves and axes, plus the prostrate habit, provide useful characters for readily distinguishing the species.

#### EVOLUTION/REPRODUCTIVE BIOLOGY:

The abundance of individuals in saline regions, plus the presence of scale-like hairs typical of salinity tolerant plants, suggest the evolution of the genus in the salt lake regions of Western Australia or strand habitats.

A pollen-ovule ratio of 151, determined for a single specimen (*Short 615*), suggests that the only species is an inbreeder (see Short 1981a, b).

***Hyalochlamys globifera*** A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:101 (April 1851). — *Angianthus globifer* (A. Gray) Benth., Fl. Austr. 3:567 (1867); Grieve & Blackall, W. Aust. Wildfls 815 (1975). — *Styloncerus globifer* (A. Gray) Kuntze, Rev. Generum Pl. 367 (1891). TYPE: "Swan River, Drummond." LECTOTYPE (here designated): *Drummond 204*, Sw. river, s. dat. (K). ISOLECTOTYPES: PERTH, GH (ex herb. Klatt), GH (lacks collector's number but label appears to be in Gray's hand). POSSIBLE ISOLECTOTYPE: MEL 541626 (ex herb. O. W. Sonder), lacks collector's number.

*Annual herb*. Major axes 0.5-2.5 cm long. *Leaves* 0.5-1.2 cm long, 0.1-0.2 cm wide. *Compound heads* c. 0.4-0.8 cm high, 0.4-0.8 cm diam.; bracts subtending compound heads 0.5-0.7 cm long, 0.4-0.6 cm wide. *Capitular bracts* 3(?4), the two concave bracts 3-4.5 mm long, the inner bracts c. the length or slightly exceeding the length of the achene. *Florets* 1; corolla (4)5-lobed, the tube tapering gradually to an expanded base covering  $\pm$  the top of the achene, 1.7-1.9 mm long, c. 0.2 mm diam.; anthers (4)5, each with c. 30 pollen grains. *Achenes*  $\pm$  obpyriform, 1.1-1.3 mm long, 0.5-0.6 mm diam.

DISTRIBUTION: See generic treatment.

#### ECOLOGY:

Commonly grows on the margins of salt lakes but is also found in shallow depressions at the base of granite outcrops. Collectors' notes include "Growing in upper *Arthrocnemum* [= *Halosarcia*] zone extending to *Melaleuca* and *Eucalyptus* regions around salty depression. Sandy loam", "Growing on sandy rises with *Angianthus*, *Aizoon glabrum*, *Stipa*, *Frankenia* in *Hakea*/*Melaleuca* scrub" and "Sandy loam at base of granite".

#### SELECTED SPECIMENS EXAMINED (6/29):

*Western Australia* — *Chinnock 4412* & *Wilson*, Mortlock River just east of Meckering, 22.xi.1978 (AD); *Short 636*, southern margins of Lake Brown, 22.ix.1977 (AD); *Short 661*, Roe Dam, 23.ix.1977 (AD); *Short 684*, Purnta Rock, 26.ix.1977 (AD); *Tölken 65194*, NE. end of Lake Johnston, 9.x.1979 (AD); *Wilson 8807*, Lake Barlee, 25.viii.1970 (PERTH).

8. ***Pogonolepis*** Steetz in Lehm. Pl. Preiss. 1:440 (1845). — *Skirrhophorus* DC. in Lindl. ex DC. sect. *Pogonolepis* (Steetz) A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:149 (1851). TYPE: *Pogonolepis stricta* Steetz.

[*Angianthus* auct. non Wendl.: as to *A. strictus* (Steetz) Benth. & *A. lanigerus*

Ewart & J. White, used in various works.]

[*Siloxerus* auct. non Labill.: as to *S. strictus* (Steetz) Ostenf.]

[*Skirrhophorus* auct. non DC. in Lindl. ex DC.: as to *S. strictus* (Steetz) A. Gray and *S. muellerianus* Sond.]

[*Styloncerus* auct. non Spreng., *nom. illeg.*: as to *S. strictus* (Steetz) Kuntze]

*Annual herbs*. Major axes decumbent, ascending or erect, variably hairy; stem simple or forming major branches at basal and/or upper nodes. *Leaves* usually alternate (sometimes opposite), sessile, entire, glabrous or sparsely hairy, mucronate. *Compound heads*  $\pm$  broadly obovoid; bracts subtending compound heads forming a conspicuous, multi-seriate involucre c. the length of the head, the outer bracts leaf-like, the inner ones primarily hyaline and with papillae at the apex; *general receptacle* a small,  $\pm$  flat, glabrous axis. *Capitula* c. 5-40 per compound head. *Capitular bracts* 2-3, c. the length of the florets,  $\pm$  hyaline, whitish, with papillae at the apex. *Florets* 1 per capitulum; corolla 5-lobed; style branches truncate; stamens 5, with tailed anthers. *Achenes*  $\pm$  ovoid or  $\pm$  obpyramidal, covered with mucilagenous cells, brown. Pappus absent. Fig. li.

Chromosome numbers:  $n=4, 5, 6, 7, c. 10, c. 12$ .

The taxonomy of *Pogonolepis* is yet to be resolved. For comments see *Muelleria* 4:404-405 (Short, 1981a).

Three species normally referred to *Angianthus*, i.e. *A. lanigerus*, *A. muellerianus* (= *P. muelleriana* (Sond.) Short) and *A. strictus* (= *P. stricta* Steetz) belong to *Pogonolepis*. The new combination transferring *A. lanigerus* to *Pogonolepis* is made below.

***Pogonolepis lanigera* (Ewart & J. White) Short, comb. nov.**

BASIONYM: *Angianthus strictus* var. *lanigerus* Ewart & J. White, *Proc. Roy. Soc. Vict.* 22:92 (1909). SYNONYM: *Angianthus lanigerus* (Ewart & J. White) Ewart & J. White, *Proc. Roy. Soc. Vict.* 23:288 (1911).

9. *Siloxerus* Labill., Pl. Nov. Holl. 2:57 (1806); Less., Syn. generum Comp. 270 (1832); Ostenfeld, Biol. Meddel. Kongel. Danske Vidensk. Selsk. 3:134, p.p. (as to *S. humifusus* & *S. filifolius* only). — *Styloncerus* Spreng., Syst. veg. 3:356, 451 (1826), *nom. illeg.* — *Ogcerostylus* Cass., Dict. Sc. Nat. 49:221 (1827), *nom. illeg.*; Stuedel, Nom. Bot. 2nd. ed. 242 (1841) ('*Oxerostylus*'). TYPE: *Siloxerus humifusus* Labill.

*Chamaesphaerion* A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:176 (June 1851). TYPE: *Chamaesphaerion pygmaeum* A. Gray (= *S. pygmaeus* (A. Gray) Short).

*Gyrostephium* Turcz., Bull. Soc. Naturalistes Moscou 24(2):76 (Oct. 1851). TYPE: *Gyrostephium rhizocephalum* Turcz. (= *S. pygmaeus* (A. Gray) Short).

[*Angianthus* auct. non Wendl.: see synonymy of *S. humifusus* & *S. filifolius*.]

[*Chthonocephalus* auct. non Steetz: see synonymy of *S. pygmaeus*.]

[*Gnaphalodes* auct. non A. Gray, *nom. illeg.*, later homonym of *Gnaphalodes* Miller (see Hj. Eichler, Taxon 12:295 (1963): as to *Gnaphalodes filifolium* Benth. (= *Siloxerus filifolius*).]

*Annual herbs*. Major axes  $\pm$  absent or if present then decumbent to erect, glabrous or hairy; stem simple and minute or forming major branches at basal and/or upper nodes. *Leaves* in a basal rosette or, if major axes present then opposite to alternate, all leaves entire, sessile, glabrous or sparsely hairy, apex mucronate, the base often with hyaline margins. *Compound heads*  $\pm$  ellipsoid to broadly ellipsoid or  $\pm$  lanceoloid to depressed ovoid; bracts subtending compound heads conspicuous, leaf-like, at least c.  $\frac{1}{4}$  to  $\frac{1}{2}$  the length of the head, often c. equal to or exceeding the length of the head; *general receptacle* of a single hairy axis which lacks minor receptacular axes, the axis becoming hollow with age. *Capitula*  $\pm$  evenly distributed over the general receptacle,  $\pm$  indistinct and lacking subtending bracts. *Capitular bracts* c. 5-15, mainly hyaline but the uppermost portion opaque and often crenulate, with a green,  $\pm$  glabrous midrib which extends c.  $\frac{1}{2}$ - $\frac{2}{3}$  the length of the bract, the bracts arranged in  $\pm 1$  or 2 indistinct whorls. *Paleae* resembling capitular bracts, one bract per floret. *Florets* 4-15(22) per capitulum; corolla 3-5-lobed; style branches truncate; stamens 3-5, with tailed anthers. *Achenes*  $\pm$  obovoid, sparsely to densely papillose, purple. Pappus of 5-7 variably jagged scales joined at the base or a jagged ring lacking distinct scales. Fig. 15.

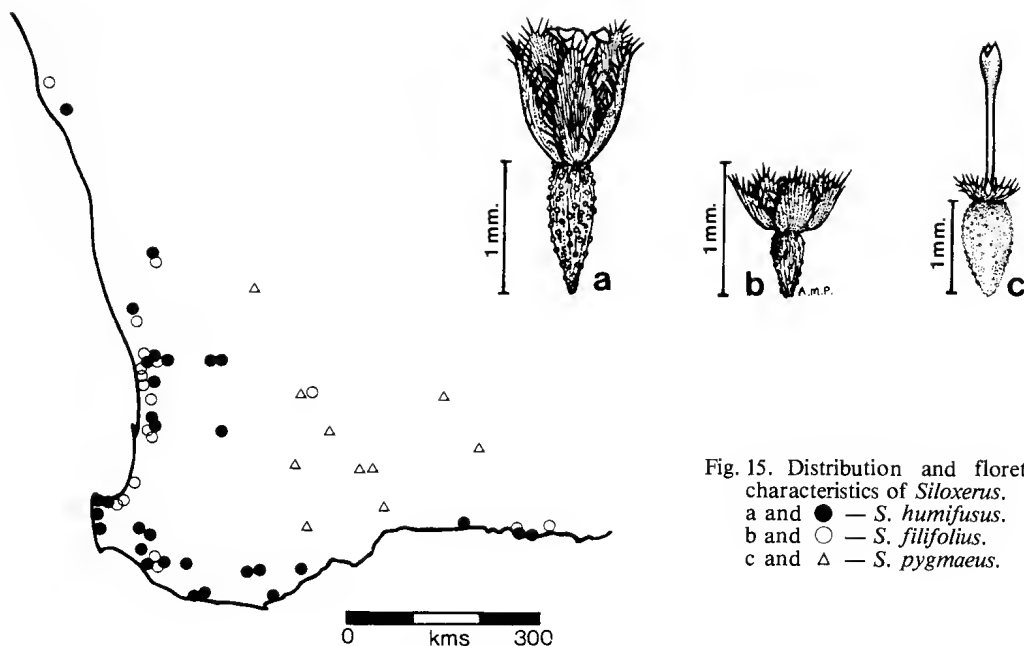


Fig. 15. Distribution and floret characteristics of *Siloxerus*.  
a and ● — *S. humifusus*.  
b and ○ — *S. filifolius*.  
c and △ — *S. pygmaeus*.

#### DISTRIBUTION (Fig. 15):

South-west of Western Australia.

#### AFFINITIES/GENERIC CHARACTERISTICS:

*Siloxerus* contains 3 species. It is readily distinguished from all other members of *Angianthus* s.l. by the presence of paleae, a hairy general receptacle, the  $\pm$  obovoid, purple, papillose achenes and the more or less rigid nature of both the capitular and receptacular bracts. Unlike other members of *Angianthus* s.l. the capitula in members of this genus are somewhat ill-defined.

The genus has no obvious affinities with other members of the “*Angianthus* group” (sensu Merxmüller *et al.*, 1977) and any affinities with other members of the Gnaphaliinae are yet to be determined.

#### EVOLUTION/REPRODUCTIVE BIOLOGY:

All species, as evidenced by approximate P/O determinations of c. 200 (Short 1981a, b), are inbreeders. They have close affinities with one another and indeed *S. humifusus* may be a polyploid directly derived from *S. filifolius* (see note 1 under *S. humifusus*).

#### KEY TO SPECIES OF SILOXERUS

1. Stem apparently absent; compound heads depressed ovoid, c. 0.4-0.6 cm long, 0.6-1.1 cm diam. . . . . 3. *S. pygmaeus*
1. Stem simple or branching, the major axes decumbent to erect, 1-7(9) cm long; compound heads ellipsoid to broadly ellipsoid or ovoid to broadly depressed ovoid, c. 0.6-2.9 cm long, c. 0.5-1.5 cm diam.
  2. Pappus c.  $\frac{1}{2}$  or rarely the length of the floret; capitular bracts and paleae (2)2.5-4.5(6.3) mm long . . . . . 2. *S. humifusus*
  2. Pappus c. equal to or slightly exceeding the length of the floret; capitular bracts and paleae 1.25-1.9 mm long . . . . . 1. *S. filifolius*

1. *Siloxerus filifolius* (Benth.) Ostenf., Biol. Meddel. Kongel. Danske Vidensk. Selsk. 3:136 (1921). — *Gnaphalodes filifolium* Benth., Fl. Austr. 3:578 (1867). — *Angianthus filifolius* (Benth.) C. A. Gardner, Enum. Pl. Austr. Occ. 135 (1931); Grieve & Blackall, W. Aust. Wildfls 811 (1975). TYPE: “Murray river, Oldfield.” HOLOTYPE: Oldfield s.n., Tufts, low wet places, Murray R., W. Aust., s. dat. (K). ISOTYPE: MEL 84436 (see note 1).

*Angianthus humifusus* var. *minor* Benth., Fl. Austr. 3:563 (1867). TYPE: "Kalgan river, Oldfield." LECTOTYPE (here designated): *Oldfield* s.n., Kalgan River, s. dat. (K) (see note 2). PROBABLE ISOLECTOTYPES: K (mounted on lectotype sheet), MEL 84433.

*Annual herb*. Major axes decumbent to erect, 1-3(6.5) cm long, glabrous or variably hairy; stem simple or forming major branches at basal and/or upper nodes. *Leaves* often opposite at the base, the upper ones alternate,  $\pm$  linear or lanceolate, c. 0.5-1(1.7) cm long, c. 0.1 cm wide, at least the upper leaves mucronate, all leaves glabrous or sparsely hairy. *Compound heads*  $\pm$  ellipsoid or lanceoloid to very broadly ovoid, (0.6)1-2.4(2.7) cm long, c. 0.5-1.5 cm diam. *Capitulum* with c. 10-13 capitular bracts and paleae, all bracts obovate to widely obovate, 1.25-1.9 mm long, 0.65-1.4 mm wide, crenulate near the apex, white or pale pink. *Florets* c. 4-5; corolla 4 or 5-lobed, the tube distinctly swollen in the lower  $\frac{1}{2}$ , c. 0.35-0.65 mm long, 0.3-0.65 mm diam. *Achenes*  $\pm$  obovoid, c. 0.4-0.65 mm long, 0.2-0.3 mm diam., variably papillose. Pappus of 4-6 jagged scales joined at the base, 0.6-0.9 mm long, c. equal to or slightly exceeding the length of the floret. Fig. 15.

#### DISTRIBUTION (Fig. 15):

South-west of Western Australia being found within an approximately 200 km wide coastal belt.

#### ECOLOGY:

Data suggest that *S. filifolius*, like the closely related *S. humifusus* with which it commonly grows, is capable of growing in a variety of habitats. Collectors' notes include "Minor drainage channel in *Regelia* heath community . . . in open sandy sites", "on soil at base of granite rock in moist situations. Associated with *Angianthus* sp. under open *Acacia* scrub", "*Eucalyptus-Xanthorrhoea* community on deep grey sands. Growing c. 10 m from *Siloxerus humifusus*" and "Growing in open *Eucalyptus* woodland on brown sandy loam covered by coarse gravel. Growing with *Siloxerus humifusus*".

#### NOTES:

1. When describing *Gnaphalodes filifolium* Benth (1867) cited a collection made by Oldfield from the Murray River, Western Australia. This collection, said by Benth to consist of a single specimen, is housed at K. A duplicate of this collection, MEL 84436, also exists. Benth, as indicated by the initial B on the label, saw this specimen but apparently overlooked it when preparing his description of the species. The name *G. filifolium* does not appear on the sheet.

2. When describing the variety *Angianthus humifusus* var. *minor* Benth (1867) cited a single collection i.e., *Oldfield* s.n., Kalgan River. He described the taxon as having "Clusters of flower-heads and . . . flowers . . . much smaller" than var. *grandiflorus* (= *S. humifusus*) and "a pappus as nearly as long as the floret". The collection at K contains, as previously noted by Ostenfeld (1921), individuals belonging to two distinct taxa, namely *S. humifusus* and *S. filifolius*. The brief description of var. *minor* almost certainly refers to the latter species and indeed there is an envelope attached to the K sheet which contains a single specimen of *S. filifolius* and is clearly marked "var. *minor*, Kalgan river, Oldfield". This collection has been designated as the lectotype. Two further specimens of *S. filifolius* are mounted with specimens of *S. humifusus* and these too are marked as "var. *minor* Benth." However they are mounted on a separate piece of paper which has been subsequently attached to the main sheet and are referred to as probably isoelectotype material. The sheet also contains specimens of *S. humifusus* collected by Oldfield from the Kalgan River and the Gordon River, Western Australia.

A further Oldfield collection from the Kalgan River is located in MEL (MEL 84433). Although not named var. *minor* the specimens were seen by Benth (as indicated by the initial B) and are undoubtedly the same taxon. Unlike the lectotype collection it is marked with the number 84d. It is referred to here as a probable isoelectotype.

#### SELECTED SPECIMENS EXAMINED (7/43):

Western Australia — *Burbidge* 4977, 3 miles S. of Bunbury, 2.i.1956 (PERTH); *Burbidge* 7955, Twin Swamps Wildlife Sanctuary, 28.xii.1971 (CANB, PERTH); *Chinnock* 4334, Mt. Walker Rock, 10.xi.1978

(AD); *Demarz 5351*, Orleans Farm, 16.x.1974 (KP, PERTH); *Short 1056*, c. 10 km from Jarrahwood along road to Nannup, 22.xi.1979 (AD); *Short 1058*, c. 41 km from Kojonup along main Boyup Brook road, 23.xi.1979 (AD); *Willis s.n.*, North Twin Peak Island, 20.xi.1950 (MEL).

2. *Siloxerus humifusus* Labill., Pl. Nov. Holl. 2:57 (1806); Less., Syn. generum Comp. 270 (1832). — *Styloncerus humifusus* (Labill.) Spreng., Syst. Veg. 3:451 (1826); DC., Prod. 6:149 (1838); Steetz in Lehm. Pl. Preiss. 1:435 (1845). — *Ogcerostylus humifusus* (Labill.) Cass., Dict. Sci. Nat. 49:222 (1827); Steud., Nomen. Bot. 2nd ed. 2:242 (1841) ('*Oxerostylus*') (n.v.). — *Angianthus humifusus* (Labill.) Benth., Fl. Austr. 3:563 (1867); Grieve & Blackall, W. Aust. Wildfls 811 (1975). TYPE: "Habitat in terra Van-Leuwin." HOLOTYPE: ?*Labillardiere* s.n., habitat in terra van-Leuwin, s. dat. (FI).

*Styloncerus cylindraceus* Steetz in Lehm., Pl. Preiss. 1:435 (1845). TYPE: "In sinu regis Georgii III. mense Nov. 1840. Herb. Preiss. No. 41." LECTOTYPE (here designated): *Preiss 41*, In Nova Hollandia, (Swan-River Colonia) in sinu regis Georgii III, s. dat. (MEL 541624, ex herb. Steetz). ISOLECTOTYPES: LD, MEL 54151 (ex herb O. W. Sonder), S. (See p.152).

*Styloncerus suberectus* Steetz in Lehm. Pl. Preiss. 1:436 (1845). TYPE: "In arenosis terrae in ferioris, mense Dec. 1839. Herb. Preiss. no. 42." LECTOTYPE (here designated): *Preiss 42*, in arenosis terrae inferioris (Swan River Colonia), s. dat. (MEL 541622, ex herb. Steetz). ISOLECTOTYPES: LD, MEL 541623 (herb O. W. Sonder). (See p.152).

*Angianthus humifusus* var. *grandiflorus* Benth., Fl. Austr. 3:563 (1867), type as for *S. suberectus*.

*Annual herb*. Major axes decumbent to erect, 2-7(9) cm long, glabrous or variably hairy; stem simple or forming major branches at basal and upper nodes. *Leaves* often opposite at the base of the major axes, the upper ones alternate, all leaves  $\pm$  linear or lanceolate, (c. 1)1.5-3 cm long, c. 0.1-0.15 cm wide, glabrous or sparsely hairy, at least the upper ones mucronate. *Compound heads*  $\pm$  broadly ellipsoid or ovoid to broadly depressed ovoid, c. 0.6-2(2.9) cm long, (c. 0.5)0.7-1.2(1.3) cm diam. *Capitulum* with c.8-10 capitular bracts and paleae, all bracts oblanceolate to obovate, (c. 2)2.5-4.5(6.3) mm long, (0.7)0.9-1.7(1.9) mm wide, crenulate near the apex, white or pale pink. *Florets* c. 5; corolla 4 or 5-lobed, the tube distinctly swollen in the lower  $\frac{1}{2}$ , (c. 0.85)1-2(2.25) mm long, c. 0.3-0.5 mm diam. *Achenes*  $\pm$  obovoid, c. 0.7-0.95 mm long, c. 0.25-0.4 mm diam., variably papillose. Pappus of 5-7 jagged scales fused at the base, c. 0.95-1.7 mm long, c.  $\frac{1}{2}$  or rarely the length of the floret. Fig. 15.

DISTRIBUTION (Fig. 15):

South-west of Western Australia, within an approximately 200 km wide coastal belt.

#### ECOLOGY:

Grows in a variety of habitats. Collectors' notes include "Recently dried muddy depression in sandy swamp under *Acacia cyanophylla*", "Rush marsh . . . under shrubs of *Astartaea fascicularis* with *Cotula coronopifolia* and *Schoenus trachycarpus*", "*Eucalyptus-Xanthorrhoea* community on deep grey sands. Growing c. 10 cm from *Siloxerus filifolius*" and "Growing in open *Eucalyptus* woodland on brown sandy loam covered by coarse gravel. Growing with *Siloxerus filifolius*".

#### NOTES:

1. *S. humifusus* is primarily distinguishable from *S. filifolius* on differences in size of various organs, the achenes, capitular bracts, paleae, pappus scales and florets of *S. humifusus* being approximately twice the length of the same organs in the latter species. Such features suggest that *S. humifusus* may be of polyploid origin.

2. Bentham (1867) recognised two varieties of *Angianthus humifusus*, var. *minor* Benth. and var. *grandiflorus* Benth. The former variety is recognised here as a distinct species, *Siloxerus filifolius*. The latter variety was based on *Preiss 42*, the type collection of *Styloncerus suberectus* Steetz, which possesses larger capitular bracts and paleae (c. 4-6.3 mm long) than those of *Preiss 41*, (c. 3.7-4.2 mm long), the type of *Styloncerus cylindraceus* Steetz. Furthermore in *Preiss 42* the pappus is about one-half the length of

the floret whereas in *Preiss 41* it is approximately the length of the floret. Thus it is not surprising that in the past *S. suberectus* and *S. cylindraceus* have been recognised as different taxa. Initially it was felt that these separate taxa could be maintained. However, although extensive field studies have not been made, examination of other herbarium collections has shown that the recognition of two taxa is apparently not tenable, the size of the bracts and the ratio of pappus length to floret length being quite variable.

#### SELECTED SPECIMENS EXAMINED (6/97):

*Western Australia* — Abbot 53, Woody Island, Recherche Archipelago, ii.1976 (MEL); *Burbidge 7945*, Twin Swamps Wildlife Sanctuary, 11.i.1972 (CANB); *Burbidge 7962*, Twin Swamps Wildlife Sanctuary, 20.i.1972 (CANB, PERTH); *Congdon 75034b*, Blackwood River Estuary, 29.xi.1975 (PERTH); *Short 1055*, c. 1 km from Jarrahwood along road to Nannup, 22.xi.1979 (AD); *Short 1059*, c. 41 km from Kojonup along main Boyup Brook road, 23.xi.1979 (AD).

3. *Siloxerus pygmaeus* (A. Gray) Short, *Muelleria* 4:413 (1981). — *Chamaesphaerion pygmaeum* A. Gray, Hook. J. Bot. Kew Gard. Misc. 3:177 (June 1851). — *Chthonocephalus pygmaeus* (A. Gray) Benth., Fl. Austr. 3:582 (1867); Grieve & Blackall, W. Aust. Wildfls 820 (1975). TYPE: "South-western Australia, Drummond." LECTOTYPE: (here designated): *Drummond 55*, S.W. Australia, 1850 (K). ISOLECTOTYPES: GH (ex herb. Klatt), MEL 542228, PERTH (ex herb. K, ex herb. TCD).

*Gyrostephium rhizocephalum* Turcz., Bull. Soc. Naturalistes Moscou 24(2):77 (Oct. 1851). TYPE: "Nova Hollandia. Drum.V.n.55." HOLOTYPE: ? CW, n.v. (see p.000). ISOTYPES: GH (ex herb. Klatt), K, PERTH (ex herb. K, ex herb. TCD).

*Annual*, almost stemless herb consisting of a compound head surrounded by a basal rosette of c. 10-20(30) leaves. *Leaves* lanceolate, c. 0.5-1 cm long, c. 0.1 cm wide, glabrous or sparsely hairy, mucronate and usually with distinct hyaline margins at the base. *Compound heads* depressed ovoid, c. 0.4-0.6 cm long, 0.6-1.1 cm diam. *Capitulum* with (18)20-30 capitular bracts and paleae, all bracts narrowly elliptic to elliptic or sometimes oblanceolate to obovate, 3.2-4.2(4.5) mm long, (0.75)0.85-1.5 (1.85) mm wide, white. *Florets* c. 10-20; corolla 3- or rarely 4-lobed, the tube tapering gradually to the base, 1.5-1.8(2.1) mm long, 0.2-0.25 mm diam. *Achenes* ± obovoid, 0.6-0.75(0.85) mm long, 0.3-0.5 mm diam., papillose. Pappus a jagged ring c. 0.15-0.45 mm long. Fig. 15.

Chromosome number:  $n = c. 12$  or  $13$ .

#### DISTRIBUTION (Fig. 15):

South-west of Western Australia, occurring south of latitude c. 30°S and between longitudes c. 117°E and c. 122°E.

#### ECOLOGY:

Generally restricted to saline, sandy soils surrounding inland salt lakes but also found at the base of granite outcrops. Collectors' notes include "Granite outcrops . . . Sandy loam amongst *Eucalyptus* woodland at base of rock", "White to greyish sand between *Melaleuca* and extending into *Arthrocnemum* [= *Halosarcia*] zone around salt depression" and "Growing in open areas on pale brown, very sandy loam between *Melaleuca* and *Eucalyptus* above saline depression".

#### NOTE:

1. Apparently mature achenes of this species exhibit marked size differences within any one compound head. Some fruits are c. 1½ times larger than the majority. It is difficult to ascertain their exact location but they appear to occur on the outer margins of the compound heads. The larger fruits generally appear to germinate several days earlier than the smallest ones in the heads. Such a staggering of germination times may be of adaptive value in areas of low, unreliable rainfall; that is unless sufficient moisture is available for a prolonged period of time the smaller achenes will remain dormant. A better food supply in the larger fruits may ensure their survival in adverse conditions. *S. pygmaeus*, at least in part of its range, does occur in a low rainfall area. Furthermore southern Australia has experienced greater cycles of aridity in the recent past than have occurred throughout the Tertiary period.



## SELECTED SPECIMENS EXAMINED (7/18):

Western Australia — Chinnock 4160, c. 3.5 km W. of western edge of Lake King, 26.ix.1977 (AD); Chinnock 4598, Phillips River, 17 km W. of Ravensthorpe, 8.x.1979 (AD); Newbey 4342, 16 km N. of Needilup, 4.ix.1974 (PERTH); Short 660, Roe Dam, 23.ix.1977 (AD); Short 678, 1 km E. of Wave Rock, 25.ix.1977 (AD); Short 949, western edge of Lake Campion, 14.xi.1979 (AD); Short 1071, c. 10 km SW. of Pingrup, 23.xi.1979 (AD).

## SPECIES OF UNCERTAIN AFFINITY

In this revision a number of species referred to *Angianthus* by Bentham (1867) are considered to belong to distinctive, segregate genera. However there are three species, namely *A. axilliflorus*, *A. burkittii* and *A. connatus* which clearly have no affinities with *Angianthus* s.str. or any of the segregate genera. They may represent monotypic genera or have affinities with other members of the Gnaphaliinae not yet examined by the author. For the time being it seems appropriate to refer *A. burkittii* to *Gnephosis*, the genus to which the species was originally referred by Bentham (l.c.).

Lectotypes have been chosen for the above three species and various attributes of each are noted below.

***Angianthus axilliflorus*** W. V. Fitzg. ex. Ewart & J. White, Proc. Roy. Soc. Vict. 22:315, pl. 56, figs. 1-3, (1909) ('*axiliflorus*'); W. V. Fitzg., J. Bot. 50:21 (1912); Grieve & Blackall, W. Aust. Wildfls 812 (1975) ('*axiliflorus*'). TYPE: Cowcowing, W. Australia. Max Koch, Oct., 1904. No. 1196." LECTOTYPE (here designated): *Koch 1196*, Cowcowing, 1904 (MEL 541217). ISOLECTOTYPES: AD, MEL 541218, MEL 541219, NSW (2 sheets), PERTH (see note 1 below).

## NOTES:

1. Ewart & White (1909), working in Melbourne, noted that the "species was received, marked W. V. Fitzgerald inedit. from both the collector and the Sydney Herbarium" (p. 316). All three MEL sheets bear good specimens but MEL 541217, the sheet containing the specimens received from NSW and the only one marked with the word "ined.", has been chosen as the lectotype.

2. The rigid, leaf-like capitulum-subtending bracts and the arrangement of the caputular bracts readily distinguish this species from all others included in *Angianthus* s.l.

3. The species is apparently rare. Apart from the type material the only other collection of the species seen by the author is *Blackall 1276*, collected from the edge of a salt lake near Newdegate, Western Australia in 1931.

***Angianthus connatus*** W. V. Fitzg., J. West. Aust. Nat. Hist. Soc. 2:24 (1905); Grieve & Blackall, W. Aust. Wildfls 816 (1975). TYPE: "Minginew.-W. V. F., September, 1903." LECTOTYPE (here designated): *Fitzgerald s.n.*, Minginew, W.A., -ix.1903 (NSW 138682). ISOLECTOTYPES: NSW 138683, PERTH (ex W. E. Blackall) (see note 1 below).

## NOTES:

1. Both of the NSW collections, unlike the PERTH collection, are clearly designated as coming from Fitzgerald's herbarium. Of the two sheets NSW 138682 contains the best material and therefore has been designated as the lectotype. The remaining one, NSW 138683, has the word "type" written on the label, possibly in Fitzgerald's hand, but there is no reason to believe that Fitzgerald did not base his description on all of the material available to him.

2. The species is known only from the type collection. It is readily distinguished from other members of *Angianthus* s.l. by the presence of long hairs at the base of the florets or apex of the achenes and the rigid, opaque capitulum-subtending bracts. The morphology of the caputular bracts is also unique.

***Gnephosis burkittii*** Benth., Fl. Austr. 3:570 (1867). — *Angianthus burkittii* (Benth.) J. M. Black, Fl. S. Aust. 1st ed. 645, pl. 53 (1929), 2nd ed. 925, fig. 1227 (1957); Hj. Eichl., Suppl. to J. M. Black's Fl. S. Aust. 326 (1965); Willis, Handb. Pl. Vict. 2:730

(1973); Grieve & Blackall, W. Aust. Wildfls 813 (1975). TYPE: "Lake Gillies, Burkitt." LECTOTYPE (here designated): *Burkitt s.n.*, Lake Gillies, s. dat. (MEL 541211). ISOLECTOTYPE: K (see note 1 below).

*Angianthus whitei* J. M. Black, Trans & Proc. Roy. Soc. S. Aust. 37:122, pl. 4 (1913). TYPE: "Corunna Station, Eyre Peninsula, August, 1912." LECTOTYPE (here designated): *White s.n.*, Corunna Statn., W. of Pt. Augt., near Lake Gilles, 27.viii.1912 (AD 98103150). ISOLECTOTYPES: MEL 541611, NSW 7831/13.

#### NOTES:

1. Both of the sheets containing type material of *G. burkittii* were seen by Bentham. The MEL sheet contains by far the better collection and thus has been chosen as the lectotype.

2. The reddish, prostrate or ascending major axes, the woolly compound heads and the pappus of 8-12 barbed bristles readily distinguish this species from others included in *Angianthus s.l.* The capitular bracts are also unique to this species.

#### NAMES OF UNCERTAIN APPLICATION

Bentham (1867) described as new a species he called *Angianthus plumiger*. His description was based on collections made by Oldfield from the Swan and Murchison rivers. It could be expected that type specimens of this species would be housed in K and/or BM but apparently no collections of this taxon exist in either institution (A. A. Munir & J. Lewis, pers. comms, 1980). No specimens have been located in E or any Australian herbaria. From the description it seems that the name should not be applied to any species, old or new, described in the current revision of *Angianthus s.l.*

Cassini (1820) described as new the genus *Hirnellia* and attributed to it a single species *H. cotuloides* Cass. De Candolle (1838) regarded *H. cotuloides* as a possible synonym of *Angianthus tomentosus* but it was not listed as such by Bentham (1867) and subsequent workers on the Australian flora. It has not been possible to view type material but from the published description it appears that the name is not a synonym of *A. tomentosus*.

#### ACKNOWLEDGEMENTS

Work on this paper was primarily carried out when I was the recipient of a Commonwealth Postgraduate Research Award at the Flinders University of South Australia. I sincerely thank my supervisor, Dr B. A. Barlow, for his general advice throughout the project and for his comments on the original manuscript.

Many other people, in particular the staff at AD and my colleagues in MEL, have contributed to my studies by collecting various species and by providing constructive criticism of the manuscript. I thank them all, especially the following: Dr W. R. Barker for the translation of descriptions of new species into Latin, for collections of various species and for general comments relating to terminology, typification and descriptive format; Mr R. J. Chinnock for his collections, for testing the keys and for allowing me to accompany him on an extensive field trip to Western Australia in 1977; Dr Hj. Eichler for originally suggesting the project and for providing publication dates of the *Bull. Soc. Imp. Naturalistes Moscou*; Miss H. I. Aston and Dr J. H. Ross for comments on the manuscript.

I also thank Miss A. M. Podwyszynski for the illustrations.

Much of my working time from January 1977 to January 1980 was spent at AD and I thank Dr J. P. Jessop for making available the facilities of that institute.

Field work in 1977 was made possible by the generosity of the Board of the Adelaide Botanic Gardens which allowed me to accompany Mr Chinnock to Western Australia. Thanks are also due to Ms D. Nicholas and Mr M. Tippet for field assistance in Western Australia in 1979, this trip being partly financed by the Flinders University Research Committee.

Finally I thank Ms T. Munro and Ms M. James for typing the manuscript.

## REFERENCES

- Bentham, G. (1863). 'Flora Australiensis' vol. 1. (Reeve: London). Preface, pp. 1-18.
- Bentham, G. (1867). 'Flora Australiensis' vol. 3. (Reeve: London). Compositae, pp. 447-680.
- Bentham, G. (1873a). Compositae. In Bentham, G. & Hooker, J. D., 'Genera Plantarum' vol. 2. (Reeve: London). pp. 163-533.
- Bentham, G. (1873b). Notes on the classification, history and geographical distribution of the Compositae. *J. Linn. Soc. (Bot.)* 13: 335-577.
- Besold, B. (1971). Pollenmorphologische Untersuchungen an Inuleen (Angianthinae, Relhaniinae, Athrixiinae). *Dissertationes Botanicae* 14.
- Bettenay, E. & Mulcahy, M. J. (1972). Soil and landscape studies in Western Australia. (2) Valley form and surface features of the south-west drainage division. *J. Geol. Soc. Aust.* 18: 359-369.
- Black, J. M. (1929). 'Flora of South Australia' pt. 4, ed. 1. (Govt. Printer: Adelaide). pp. 570-662.
- Cassini, H. (1820). Description d'un nouveau genre de plantes (*Hirnellia*). *Bull. Sci. Soc. Philom. Paris* pp. 57-58.
- Court, A. B. (1972). Preliminary notice on the Sonder collection in the National Herbarium of Victoria. *Muelleria* 2:188.
- De Candolle, A. P. (1813). 'Théorie élémentaire de la botanique'. (Paris).
- De Candolle, A. P. (1836). 'Prodromus Systematis Naturalis Regni Vegetabilis' vol. 5. (Paris). Compositae, pp. 4-706.
- De Candolle, A. P. (1838). 'Prodromus Systematis Naturalis Regni Vegetabilis' vol. 6. (Paris). Compositae, pp. 1-687.
- De Jong, D. C. D. (1965). A systematic study of the genus *Astranthium* (Compositae, Astereae). *Mich. State Univ. Publ. Biol. Ser.* 2: 429-528.
- Eichler, H. J. (1963). Some new names and new combinations relevant to the Australian flora. *Taxon*. 12: 295-297.
- Gardner, C. A. (1931). 'Enumeratio Plantarum Australiae Occidentalis'. (Govt. Printer: Perth).
- Gardner, R. C. (1977). Observations on tetramerous disc florets in the Compositae. *Rhodora* 79: 139-146.
- Gray, A. (1851). Characters of some Gnaphalioid Compositae of the division Angianthae. *Hook. J. Bot. Kew Gard. Misc.* 3: 97-102, 147-153, 172-178.
- Heywood, V. H. (1971). Systematic survey of Old World Umbelliferae. In Heywood, V. H. (ed.) 'The Biology and Chemistry of the Umbelliferae'. (Academic Press: London & New York). pp. 31-41.
- Heywood, V. H., Harborne, J. B. & Turner, B. L. (eds) (1977). 'The Biology and Chemistry of the Compositae'. (Academic Press: New York & London). 2 vols.
- Heywood, V. H., Harborne, J. B. & Turner, B. L. (eds) (1977). An overture to the Compositae. In Heywood, V. H., Harborne, J. B. & Turner, B. L. (eds), l.c. 1: 1-20.
- Heywood, V. H. & Humphries, C. J. (1977). Anthemideae — systematic review. In Heywood, V. H., Harborne, J. B. & Turner, B. L. (eds), l.c. 2: 851-898.
- Hoffman, O. (1890). Inuleae — Angianthae. In Engler, A. & Prantl, K. (eds), 'Die natürlichen Pflanzenfamilien'. (Engelmann: Leipzig). 4 (5): 192-195.
- Holmgren, P. K. & Keuken, W. (1974). 'Index Herbariorum. Part 1. The Herbaria of the World', ed. 1. *Regnum Veg.* 92: 1-397.
- Ising, E. H. (1922). Ecological notes on South Australian plants. Part 1. *Trans. & Proc. Roy. Soc. S. Aust.* 46: 583-606.
- Jessop, J. P. (1977). Endangered species in the South Australian native vascular flora. *J. Adelaide Bot. Gard.* 1: 135-139.
- Keighery, G. J. (1982). Pollination syndromes and breeding systems of Western Australian arid zone plants. In Barker, W. R., Greenslade, P. J. M. & Baverstock, P. R. (eds), 'Evolution of the Flora and Fauna of Arid Australia'.
- King, R. M. & Robinson, H. (1966). Generic limitations in the *Hofmeisteria* Complex (Compositae — Eupatoriaceae). *Phytologia* 12: 465-476.
- Leins, P. (1971). Pollensystematische Studien an Inuleen. I. Tarchonanthinae, Pluchinae, Inulinae, Buphthalminae. *Bot. Jahrb.* 91: 91-146.
- Leins, P. (1973). Pollensystematische Studien an Inuleen. II. Filagininae. *Bot. Jahrb.* 93: 603-611.
- Leppick, E. E. (1977). The evolution of capitulum types of the Compositae in the light of insect-flower interaction. In Heywood, V. H., Harborne, J. B., & Turner, B. L. (eds), 'The Biology and Chemistry of the Compositae'. (Academic Press: London, New York & San Francisco). 1: 61-89.
- Lessing, C. H. (1832). *Crossolepis*. 'Synopsis generum Compositarum'. (Berlin). p. 270.
- Merxmüller, H. Leins, P. & Roessler, H. (1977). Inuleae — systematic review. In Heywood, V. H., Harborne, J. B. & Turner, B. L. (eds), 'The Biology and Chemistry of the Compositae'. (Academic Press: London, New York & San Francisco). 1: 577-602.
- Mirbel, C. F. B. de (1815). 'Elemens de physiologie vegetale et de botanique' vol. 1. (Paris).
- Mueller, F. J. H. (1888). The Melbourne Herbarium. *Gard. Chron.* 4: 211-212.
- Mueller, F. J. H. (1889). 'Second systematic census of Australian plants. Part 1. Vasculares'. (McCarron, Bird & Co.: Melbourne).
- Mulcahy, M. J. & Bettenay, E. (1972). Soil and landscape studies in Western Australia. (1) The major drainage divisions. *J. Geol. Soc. Aust.* 18: 349-357.
- Necker, N. J. de (1790). 'Corollarium ad Philosophiam botanicum Linnaei spectans'. (Neuwied).
- Nordenstam, B. (1980). The herbaria of Lehmann and Sonder in Stockholm, with special reference to the Ecklon and Zeyher collection. *Taxon* 29: 279-291.
- Ostenfeld, C. H. (1921). Contributions to Western Australian botany. Pt. 3. *Biol. Meddel. Kongel. Danske Vidensk. Selsk.* 3: 1-44.

- Robinson, H. & King, R. M. (1977). Eupatorieae — systematic review. In Heywood, V. H., Harborne, J. B. & Turner, B. L. (eds), 'The Biology and Chemistry of the Compositae'. (Academic Press: London, New York & San Francisco). 1: 437-485.
- Roth, I. (1977). Fruits of Angiosperms. In Zimmerman, W., Carlquist, S., Ozenda, P. & Wulff, H. D. (eds), 'Handbuch der Pflanzenanatomie'. (Gebrüder Borntraeger: Berlin & Stuttgart). 10: 1-675.
- Schodde, R. (1963). A taxonomic revision of the genus *Millotia* Cassini (Compositae). *Trans. Roy. Soc. S. Aust.* 87: 209-241.
- Short, P. S. (1981a). Pollen-ovule ratios, breeding systems and distribution patterns of some Australian Gnaphaliinae (Compositae: Inuleae). *Muelleria* 4: 395-417.
- Short, P. S. (1981b). 'Biosystematic studies in Australian Gnaphaliinae (Compositae: Inuleae)'. Ph.D. thesis, Flinders University of South Australia.
- Short, P. S. (1981c). *Cephalopterum*. In Jessop, J. P. (chief ed.), 'Flora of Central Australia'. (Reed: Sydney). p. 391.
- Skvarla, J. J., Turner, B. L., Patel, V. C. & Tomb, A. S. (1977). In Heywood, V. H., Harborne, J. B. & Turner, B. L. (eds), 'The Biology and Chemistry of the Compositae'. (Academic Press: London, New York & San Francisco). 1: 141-265.
- Smith, J. (1881). Botanical collectors. *Gard. Chron.* 16: 568-570.
- Stafleu, F. A. (1967). Taxonomic literature: a selective guide to botanical publications with dates, commentaries and types. *Regnum Veg.* 52: 1-556.
- Stafleu, F. A. & Cowan, R. S. (1976). Taxonomic literature. A selective guide to botanical publications with dates, commentaries and types. *Regnum Veg.* 94: 1-1136.
- Stafleu, F. A. & Cowan, R. S. (1979). Taxonomic literature. *Regnum Veg.* 98: 1-99.
- Stafleu, F. A. & Cowan, R. S. (1981). Taxonomic literature. *Regnum Veg.* 105: 1-980.
- Stearn, W. T. (1962). 'Three prefaces on Linnaeus and Robert Brown'. (Cramer: Weinheim).
- Systematics Association Committee for Descriptive Terminology (1962). Terminology of simple symmetrical plane shapes (Chart 1). *Taxon* 11: 145-156, 345-347.
- Turczaninow, N. (1851). Synanthereae. Quaedam hucusque indeductae. *Bull. Soc. Naturalistes Moscou* 24 (1): 166-214; 24 (2): 59-95.
- Turner, B. L. (1970). Chromosome numbers in the Compositae. XII. Australian species. *Amer. J. Bot.* 57: 382-389.
- Wagenitz, G. (1976). Was ist eine Achäne? Zur Geschichte eines karpologischen Begriffs. *Candollea* 31: 79-85.

## INDEX TO GENERA AND SPECIES OF COMPOSITAE

New names are in **bold**. Synonyms and misapplied names are in *italics*. Page numbers which refer to the main taxonomic treatment are in **bold**, those which refer to maps and figures are asterisked and those in brackets refer to keys.

### Actinobole 145

- Angianthus 143-146, 147\*, 148-152, (153), 154, 155\*, (156)-158, 173, 174, 179, 182, 187, 201, 203-205, 209, 210
- sect. *Pyramidatae* 144
- sect. *Skirrhophorus* 144
- sect. *Spicatae* 144
- acrohyalinus 144, 148, 151, 155\*, (157), 158\*-160
- amplexicaulis* 202
- axilliflorus 143, 144, (153), **209**
- brachypappus 143, 154, 155\*, (157), 158\*, 164, 166-168
- brachypappus* 167
- var. *conocephalus* 143, 167, 168
- burkittii* 143, 144, 209
- connatus 143, 144, 148, (153), **209**
- conocephalus** 155\*, 156, (157), 158\*, 166, 167, 168, 171
- cornutus** 143, 155\*, (156), 158\*, **169**, 170\*
- cunninghamii 144, 148, 154, 155\*, (156), **178**, 179
- cyathifer** 143, 151, 155\*, (157), 160, 161
- demissus* 181
- drummondii 155\*, (156, 157), **174**-177
- eriocephalus* 151, 176
- filifolius* 205
- flavescens* 164
- glabratus** 143, 147\*, 154, 155\*, (157), 158\*, 162, 163\*
- globifer* 203
- humifusus* 149, 207

- var. *grandiflorus* 207
- var. *minor* 206, 207
- lanigerus* 144, 203, 204
- microcephalus 149, 154, 155\*, (156), **173**, 174
- micropodioides 153, 155\*, (156, 157), 158\*, **168**, 169, 171
- micropoides* 168
- var. *filaginoides* 168
- milnei 147\*, 151, 155\*, (156, 157), 158\*, **159**, 160
- milnei* 169
- muellerianus* 204
- mysurosoides* 198
- phyllocalymmeus* 180
- phyllocephalus* 183
- platycephalus* 174
- pleuropappus* 180
- plumiger 210
- preissianus 148, 151, 155\*, (156), 158\*, 175-176, 177
- prostratus** 143, 151, 155\*, (156), 171, 172\*
- pusillus* 189
- var. *polyanthus* 190
- pygmaeus 151, 155\*, (156), 175-177
- strictus* 149, 203, 204
- var. *lanigerus* 204
- tenellus* 193
- tomentosus 143, 147\*, 151, 153, 155\*-(157), 158\*-160, 162, **164**, 165, 210
- tomentosus* 160
- whitei* 210

- Angianthus* 179, 181, 182, 185, 201-204  
*Basedowia* 145  
*Blennospora* 145  
*Caesulia* 145  
*Calocephalus* 145, 149  
*Cassinia* 153  
*Cassinia* 153  
     *aurea* 153, 164, 166  
*Cephalipterum* 145  
     *drummondii* 145  
*Cephalosorus* 143, 144, 148, 151, (153), **182**  
     *brevipapposus* 183  
     *carpesioides* 143, 180\*, 182, **183**  
     *gymnocephalus* 182  
     *microcephalus* 173  
     *phyllocephalus* 182, 183  
*Cephalosorus* 154  
*Chamaesphaerion* 204  
     *pygmaeum* 204, 208  
*Chrysocoryne* 143, 144, 148-151, (153), **185**,  
     186\*-(189), 191, 193, 195, 199  
     sect. *Bisquama* 185  
         *angianthoides* 190, 192  
         *drummondii* 147\*, 149, 181, 185,  
             186\*-(189), 191\*, **193**, 195, 196  
         *huegelii* 189  
         *multiflora* 143, 149, 186\*-(189), 191\*, 192,  
             194\*  
         *mysuroides* 198, 199  
         *pusilla* 147\*, 149, 185, 186\*-(189), 191\*-193  
         *pusilla* 195  
         *sp. A* 192  
         *sp. B* 196  
         *sp. C* 199  
         *tenella* 181, 193, 196  
         *tridens* 143, 148, 149, 151, 186\*-(189),  
             196, 198, **199**, 200\*  
         *trifida* 143, 149, 186\*-(189), 191\*, 196,  
             197\*  
         *uniflora* 149, 151, 185, 186\*-(189), **198**, 199  
*Chthonocephalus* 145, 204  
     *pygmaeus* 208  
*Craspedia* 145  
*Crossolepis* 187  
     *linifolia* 187  
     *pusilla* 187, 189, 193, 195  
*Crossolepis* 185  
*Cylindrosorus* 143, 153  
     *flavescens* 153, 164, 166  
*Decazesia* 145  
*Dimeresia* 145  
*Dithyrostegia* 143, 144, 148, 151, (153), 201  
     *amplexicaulis* 147\*, 201\*, **202**  
*Epitriche* 143, 144, (153), 154, 155, **181**  
     *cuspidata* 181, 182  
     *demissus* 143, 151, 180\*, **181**  
*Eriochlamys* 145  
     *behrii* 145  
*Eriocladium* 143, 154  
     *pyramidatum* 154, 178, 179  
*Eriosphaera* 145  
*Gamozygis* 143, 201  
     *flexuosa* 201, 202  
*Gnaphalium* 145  
*Gnaphalodes* 145, 204  
     *filifolium* 204-206  
*Gnephosis* 145, 209  
     *burkittii* 144, (153), 209, 210  
*Gyrostephium* 204  
     *rhizocephalum* 204, 208  
*Helichrysum* 145, 149  
*Helipterum* 145, 149  
     *sterilescens* 145  
*Hirnellia* 210  
     *cotuloides* 210  
*Hyalochlamys* 143, 144, 148, 151, (153),  
     **202**, 203  
     *globifera* 147\*, 201\*-203  
*Myriocephalus* 145  
     *stuartii* 190  
*Nablonium* 145  
*Ogcerostylus* 143, 144, 204  
     *humifusus* 207  
*Oxerostylus* 204  
*Phyllocalymma* 143, 144, 153  
     *filaginoides* 152, 168, 169  
     *mipodoides* 153, 168, 169  
*Piptostemma* 143, 182  
     *carpesioides* 182, 183  
*Pleuropappus* 143, 144, 146, 148, 149, 151, (153),  
     154, 179  
     *phyllocalymmeus* 147\*, 154, 179, **180\***, 196  
*Pogonolepis* 143-145, 148, 149, 151, (153), **203**, 204  
     *lanigera* 143, **204**  
     *muelleriana* 204  
     *stricta* 147\*, 149, 203, 204  
*Siloxerus* 143-145, 148-151, (153), **204**, (205)  
     *brachypappus* 166  
     *filifolius* 204, (205\*)-207  
     *humifusus* 204, (205\*), 206, **207**  
     *pusillus* 189  
     *pygmaeus* 204, (205\*), **208**  
     *strictus* 204  
     *tenellus* 193  
     *tomentosus* 164  
*Siloxerus* 154, 185, 204  
*Skirrhophorus* 143, 144, 153, 181, 204  
     sect. *Pogonolepis* 203  
     sect. *Psuedopappus* 144, 181  
     sect. *Skirrhophorus* 144, 154  
         *cunninghamii* 154, 178  
         *drummondii* 174  
         *demissus* 144, 181  
         *eriocephalus* 176, 177  
         *mucronulatus* 175  
         *muellerianus* 204  
         *phyllocephalus* 183  
         *preissianus* 152, 176  
         *pygmaeus* 175, 176  
         *strictus* 204  
*Stuartina* 145  
*Styloncerus* 143, 144, 154, 179, 181, 182, 185,  
     201, 202, 204  
     *amplexicaulis* 202  
     *brachypappus* 166  
     *cunninghamii* 178  
     *cylindraceus* 152, 207, 208  
     *demissus* 181  
     *drummondii* 174  
     *eriocephalus* 176  
     *globifer* 203

*humifusus* 149, 207  
*microcephalus* 173  
*micropodes* 168  
*micropodioides* 168  
*milnei* 159  
*myosuroides* 198  
*phyllocalymmeus* 180  
*phyllocephalus* 183  
*platycephalus* 174  
*preissianus* 176  
*pusillus* 189  
*pygmaeus* 175  
*strictus* 204  
*suberectus* 152, 207, 208  
*tenellus* 193  
*tomentosus* 164

Manuscript received 30 September 1981.

**STORCKIELLA AUSTRALIENSIS SP. NOV. (CAESALPINIACEAE)  
FROM NORTHERN QUEENSLAND: A NEW GENERIC RECORD  
FOR AUSTRALIA**

by

J. H. ROSS\* & B. P. M. HYLAND†

**ABSTRACT**

*Storckiella australiensis* J. H. Ross & B. P. M. Hyland sp. nov. is described from the Cook District of northern Queensland and the characters that distinguish it from other species are given. This constitutes the first record of the genus *Storckiella* Seeman for Australia.

**TAXONOMY**

The account of Caesalpiniaceae for the Flora of Australia is being prepared by one of us (J. H. R.) and this opportunity is taken of describing a new species of *Storckiella* Seem. from northern Queensland.

***Storckiella australiensis*** J. H. Ross & B. P. M. Hyland, sp. nov., affinis incertae; ab omnibus speciebus staminibus 5(6) filamentis brevibus, et foliolis paucioribus majoribus, differt.

Arbor usque ad 35 m alta, caule usque ad 120 cm diametro, anteridibus praedita. Folia imparipinnata: petiolus 2-6 cm longus; rhachis 2-11.5 cm longa; foliola (3)5, obovato-elliptica vel oblonga, 6.5-21 cm longa, 2.5-9.7 cm lata, basi cuneata, apice acuta vel acuminata, coriacea, costa et nervis lateralibus satis obviis; stipulae late ovatae, 3-4 × 2-3 mm, imbricatae, gemmam terminalem includentes, mox caducae. Inflorescentiae paniculatae, terminales vel axillares, 15-25 cm longae. Flores hermaphroditi. Sepala 5, late ovata, 5-8 mm longa, 3-6 mm lata, externe et interne ferrugineo-sericea, in alabastro imbricata, sub anthesi reflexa. Petala 5(6), elliptica 7.5-10 mm longa, 3-4 mm lata, libera, armeniaca. Stamina 5(6), libera, omnia fertilia; filamenta 0.8-1.2 mm longa; antherae basifixae, loculae rimia brevibus lateralibus apicalibus dehiscentes. Ovarium sessile, usque ad 4.5 mm longum et usque ad 1.5 mm latum, compresso-planum, basi et margine ferrugineo-sericeum. Legumen elliptico-oblongum, compresso-planum, 5-11 cm longum, 2.8-4 cm latum, dorsale late alatum, coriaceum, glabrum. Semina 1-2(5), applanata, ± reniformia, 7-10 mm longa, 10-16 mm lata, albuminosa.

*Tree* up to 35 m tall, stem up to 120 cm diameter at breast height and conspicuously buttressed in mature plants. *Bark* less than 2.5 cm thick, smoothish, with conspicuous pale or rust-coloured mostly horizontally elongated lenticels; outer blaze varying from pink to reddish-brown and texture from fibrous to granular; inner blaze pink, fibrous and with conspicuous ripple marks. *Subrhytidome layer* variable but generally showing shades of pink and red. *Heartwood* (tree 40 cm d.b.h.) pink to pale brown, with conspicuous tangential bands of parenchyma, ripple marks prominent. Young branchlets with numerous oval lenticels. *Leaves* imparipinnate, spirally arranged, rusty sericeous when young but soon becoming glabrous: petiole 2-6 cm long, terete, inconspicuously sulcate adaxially; rhachis 2-11.5 cm long; petiolules 5-15 mm long, wrinkled when dried, sulcate above; leaflets (3)5, opposite or subopposite, without stipellae, lamina obovate-elliptic or obovate-oblong, 6.5-21 cm long, 2.5-9.7 cm wide, cuneate basally, acute or acuminate apically, coriaceous, margins entire but slightly undulate, the lateral veins curved, 8-15 on either side of the midrib and forming loops well inside the blade margin, forming an angle of 50-60° with the midrib. *Stipules* broadly ovate, mostly 3-4 mm long, 2-3 mm wide, overlapping and enclosing the terminal bud, rapidly caducous, glabrous within, rusty sericeous outside and with ciliate margins. *Inflorescences* paniculate, terminal or axillary, 15-25 cm long, much-branched; lateral racemose branches 3-6 cm

\*National Herbarium of Victoria, Birdwood Avenue, South Yarra, Victoria, 3141.

†CSIRO Division of Forest Research, P.O. Box 273, Atherton, Queensland, 4883.

*Muelleria* 5(3): 215-217 (1983).



Fig. 1. *Storckiella australiensis*. a — flowering twig, x 1/2; b — flower-bud showing imbricate sepals, x 3; c — open flower showing reflexed sepals and erect stamens, x 3; d — stamen showing short filament and anther dehiscing apically, x 6; e — gynoeceum, x 6; f — pod, x 1/2; g — seed, x 1. a-e from Hyland 6357 (QRS 21157); f and g from Hyland 6603 (MEL 601574).



long, sparingly to densely rusty sericeous when young but becoming glabrous. *Flower-buds* ellipsoid. *Flowers* bisexual; pedicels of open flowers 8-11 mm long, sparingly to densely rusty sericeous. *Sepals* 5, broadly ovate, subequal or the outer 2 slightly larger, 5-8 mm long, 3-6 mm wide, sparingly to densely rusty sericeous within and without, imbricate in bud, reflexed at anthesis. *Petals* 5(6), elliptic, 7.5-10 mm long, 3-4 mm wide, apricot, alternating with the sepals. *Stamens* 5(6), free, all fertile, equal, perigynous, alternating with the petals; filaments 0.8-1.2 mm long, glabrous; anthers basifixed, 4-5 mm long, opening by lateral apical slits. *Ovary* sessile, up to 4 × 1.5 mm, compressed, 1-chambered, 4 or 5-ovulate, thinly sericeous basally and on margins but otherwise glabrous; style curved, ± 4 mm long, stigma small, terminal. *Pod* elliptic-oblong, flat, 5-11 cm long, 2.8-4 cm wide, with a wing 6-9 mm wide along the upper suture, apparently tardily dehiscent on the forest floor, brown, leathery, with fairly prominent ± transverse venation, glabrous. *Seeds* irregularly ± reniform, 7-10 mm long, 10-16 mm wide, 1 or 2(-5) per pod, pale chestnut-brown, flattened, wrinkled, albuminous. Germination epigeal, cotyledons orbicular to reniform.

TYPE COLLECTION: Queensland, Cook Distr., Portion 62 Parish of Alexandra, 16°10'S, 145°10'E, 31.viii.1972, *B. P. M. Hyland* 6357 (MEL 601493 holo.; isotypes QRS and to be distributed to BRI, CANB, K, L).

#### SELECTED SPECIMENS EXAMINED (5/10):

Queensland — Noah Creek, 16°10'S, 145°20'E, 11.x.1967, *B. P. M. Hyland* 1079 (BRI 126227, QRS 51864 & 51865). Portion 62, Parish of Alexandra, 16°10'S, 145°25'E, 19.xii.1972, *B. P. M. Hyland* 6602 (MEL 601577, QRS 21059-21065); Ibidem, *B. P. M. Hyland* 6603 (MEL 601574, QRS 21068-21074). E/P 41, Oliver Creek, V.C.L. Noah, 16°08'S, 145°22'E, 3.xi.1977, *K. Sanderson* 1236 (QRS 17096). Noah Creek, 16°06'S, 145°27'E, *L. J. Webb & J. G. Tracey* 13228 (BRI 279480).

*S. australiensis* appears to be confined to a very limited area of extremely wet lowland rainforest from about 15 to 25 kilometres north west to north east of Daintree. The annual rainfall is uncertain but apparently exceeds 3.8 metres.

When in flower, *S. australiensis* is very conspicuous and it is surprising that such a large rainforest tree has escaped formal description for so long.

The phyllotaxis in *S. australiensis* can be confusing. At times the leaves appear opposite but close inspection reveals that this effect results from axillary buds producing shoots which outgrow the parent shoot.

The occurrence in Australia of a species of *Storckiella*, a small genus of four species with a disjunct distribution pattern previously known only from Fiji and New Caledonia, is of phytogeographic interest and provides yet another example of the floristic link between these regions.

*S. australiensis* does not appear to be closely related to any of the other species. *S. australiensis* resembles *S. vitiensis* Seem. from Fiji in being a large forest tree but the latter differs in having flowers with 10(12) stamens which have filiform filaments 9-13 mm long and leaves with 9-15 leaflets (15)30-130 mm long and (8)15-50 mm wide. *S. pancheri* Baill. and *S. comptonii* Bak.f. in New Caledonia differ from *S. australiensis* in being large shrubs or small trees up to 8 m high and in having 4(5) stamens with filiform filaments up to 8 mm long, leaves with 8-13 leaflets 40-48 mm long and 10-25 mm wide, and smaller pods. The occurrence of a different stamen number in each of the three centres of distribution of the genus is of interest.

#### ACKNOWLEDGEMENTS

We are most grateful to Dr M. D. Crisp, National Botanic Gardens, Canberra, for furnishing some information on *S. vitiensis* while serving as Australian Botanical Liaison Officer at Kew Herbarium, Royal Botanic Gardens, England; to Miss A. M. Podwyszynski, National Herbarium of Victoria, for preparing the accompanying illustration, and to the Curator, Herbarium Australiense, Canberra, and the Director, Queensland Herbarium, for the loan of specimens.



# ASPLENIUM TERRESTRE AND TWO ASPLENIUM HYBRIDS: NEW FERN RECORDS FOR AUSTRALIA

by

P. J. BROWNSEY\*

## ABSTRACT

The presence of *Asplenium terrestre* Brownsey in the Australian fern flora is recorded for the first time. It occurs in Tasmania and parts of Victoria where it has previously been confused with *A. bulbiferum* Forst. f. and *A. flaccidum* Forst f. A natural hybrid between *A. terrestre* and *A. bulbiferum* is also recorded, and Australian specimens previously referred to *A. scleroprium* Hombr. are thought to belong to another hybrid combination, *A. flaccidum* x *obtusatum* Forst f.

## NEW RECORDS

*Asplenium terrestre* Brownsey, New Zealand J. Bot. 15: 71 (1977)

*Asplenium terrestre* was first described in a revision of the New Zealand species of *Asplenium* (Brownsey 1977a). Plants belonging to this species were previously included within *A. flaccidum* Forst. f. In New Zealand, *A. terrestre* is an octoploid species which can be distinguished morphologically from the tetraploid *A. flaccidum* by its more highly divided frond and its more prominently ridged spore pattern. It also differs from *A. flaccidum* in growing on the ground and having a more or less erect frond, whereas *A. flaccidum* is commonly epiphytic and has limp, pendulous fronds. In New Zealand, both *A. terrestre* and *A. flaccidum* have two distinct habit-forms, recognised at the subspecific level, which are characteristic of forest and coastal habitats respectively. The distinguishing features of all four taxa are fully described and illustrated in my original paper (Brownsey 1977a).

When first recognising *A. terrestre* as being distinct from *A. flaccidum* I regarded it as a species endemic to New Zealand. However, subsequent investigation of collections in AD, HO, MEL, NSW and WELT, together with some field observations in Tasmania, has shown that *A. terrestre* is also present in the Australian flora in addition to the more widespread *A. flaccidum*.

The plants found in Australia match very closely *A. terrestre* subsp. *terrestre* from New Zealand and can be distinguished from *A. flaccidum* subsp. *flaccidum* by the same morphological characteristics as in the latter region. I have seen no Australian specimens referable to either *A. terrestre* subsp. *maritimum* Brownsey or *A. flaccidum* subsp. *haurakiense* Brownsey which appear to be New Zealand endemics. Unfortunately it has not yet been possible to obtain chromosome counts from plants of Australian *A. terrestre* but the range of mean spore sizes from five Tasmanian populations was found to be  $42\text{--}45 \times 28\text{--}31 \mu\text{m}$  which is consistent with New Zealand material. Curiously, the range for four Tasmanian populations of *A. flaccidum* was found to be  $42\text{--}48 \times 27\text{--}30 \mu\text{m}$  which is larger than for subsp. *flaccidum* in New Zealand ( $36\text{--}44 \times 23\text{--}27 \mu\text{m}$ ), though within the range for subsp. *haurakiense* ( $43\text{--}49 \times 26\text{--}31 \mu\text{m}$ ). It is obviously desirable that chromosome counts should be obtained from Australian material to confirm that the New Zealand and Australian species are the same.

*A. terrestre* is confined in Australia to Tasmania, some of the Bass Strait islands and a few localities in southern Victoria. In Tasmania it appears to be more common than *A. flaccidum*, which is restricted to the northern half of the island. Unlike *A. flaccidum* which is normally epiphytic, *A. terrestre* grows on the ground, on damp rock faces, or at the bases of trees. It occurs in wet forest habitats and becomes progressively rarer

---

\*National Museum, Private Bag, Wellington, New Zealand.

northwards. It has been collected from Flinders Island and Cape Barren Island in Bass Strait, and from Mt. Mueller, Byaduk Caves and the Grampians in Victoria.

In Australia, plants of *A. terrestre* seem to have been confused more frequently with *A. bulbiferum* Forst. f. than with *A. flaccidum*. *Asplenium bulbiferum* and *A. terrestre* often grow in close association but the latter can be distinguished by its thicker, more leathery fronds, by the absence of bulbils and by its longer sori (2-7 mm cf. 2-4 mm).

#### REPRESENTATIVE SPECIMENS EXAMINED:

*Victoria* (3/3) — Grampians, Victoria Range, Castle Rock, 6.xi.1966, *A. C. Beauglehole* ACB 15883 (MEL 532857); Byaduk Caves, Church Cave, 2.i.1956, *A. C. Beauglehole* ACB 42827 (MEL 1502290); Mt. Mueller, nr Mt. Baw Baw, 1889, *J. Melvin* (MEL 99457-8).

*Tasmania* (4/30) — Cape Barren Is., 28.iv.1967, *J. S. Whinray* 480 (MEL 527961); Weldborough, 17.xii.1962, *T. & J. Whaite* 2644 (NSW s.n.); Liena to Lorinna Track, W. of Mole Creek, 4.i.1941, *J. Somerville* (HO 243); Betts Falls Track, Mt. Wellington, 3.viii.1981, *P. J. Brownsey* (WELT P11095).

#### *Asplenium bulbiferum* x *terrestre*

Hybrids between *A. bulbiferum* and *A. terrestre* have been collected at least twice in Australia and can be recognised by their intermediate morphology and aborted spores. The capacity of related *Asplenium* species to hybridise suggests that this combination is likely to occur wherever the two parent species grow in close proximity.

*A. bulbiferum* x *terrestre* was not amongst the nineteen different hybrid combinations initially recorded for New Zealand (Brownsey 1977b). However, it has now been found in parts of Canterbury in the South Island.

#### SPECIMENS EXAMINED:

*Victoria* (1/1) — Grampians, Victoria Range, Castle Rock, 12.ii.1960, *A. C. Beauglehole* ACB 20983 (MEL 532858).

*Tasmania* (1/1) — Betts Falls Track, Mt. Wellington, 3.viii.1981, *P. J. Brownsey* (WELT P10972-3).

#### *Asplenium flaccidum* x *obtusatum*

*A. scleroprium* Hombr. is a species that occurs only in the New Zealand region where it is confined to coastal areas, often growing alongside *A. obtusatum* Forst. f. on cliffs and in scrub exposed to salt spray (Brownsey 1977a). In Australia it has been recorded from Wilson's Promontory and adjacent islands in Victoria (Ewart 1931; Wakefield 1940; Jones & Clemesha 1981, *ut A. aucklandicum* (Hook. f.) Crookes), but these Victorian records now appear erroneous. I have been able to locate only two Australian collections which in any way resemble New Zealand plants of *A. scleroprium*. Spores from these specimens are all aborted indicating that the plants are almost certainly of hybrid origin. Their morphology suggests that they may be hybrids between *A. flaccidum* and *A. obtusatum*, a combination recorded once in New Zealand from Stewart Island (Brownsey 1977b, fig. 11).

The sterile hybrids, from both New Zealand and Australia, are very similar to *A. scleroprium* and can really only be distinguished by their aborted spores. The similarity is so striking that I postulated that *A. scleroprium* may have arisen in New Zealand as a new allopolyploid species from such sterile hybrids (Brownsey 1977b, fig. 26). If that were the case, there is no reason why the species should not also have arisen independently in Australia. However I have seen no evidence that *A. scleroprium* is present in the latter country.

#### SPECIMENS EXAMINED:

*Victoria* (2/2) — Biddy's Camp, Wilson's Promontory, xi.1927, *A. J. Ewart* (MEL 99454); Rabbit Islands, Wilson's Promontory, 5.i.1939, *E. Rossiter* (MEL 99449).

#### ACKNOWLEDGEMENTS

I am extremely grateful to Dr A. E. Orchard (HO) for first drawing my attention to plants of *Asplenium terrestre* in Tasmania and for considerable assistance with field work around Hobart in July 1981. I would also like to thank the Directors of HO and MEL for the loan of collections.

## REFERENCES

- Brownsey, P.J. (1977a). A taxonomic revision of the New Zealand species of *Asplenium*. *New Zealand J. Bot.* 15: 39-86.
- Browsey, P. J. (1977b). *Asplenium* hybrids in the New Zealand flora. *New Zealand J. Bot.* 15: 601-37.
- Ewart, A. J. (1931). 'Flora of Victoria'. (Melbourne University Press).
- Jones, D. L. and Clemesha, S. C. (1981). 'Australian Ferns and Fern Allies'. ed. 2. (Reed: Sydney).
- Wakefield, N. A. (1940). A new Victorian fern record. *Vict. Nat.* 57: 114-116.

Manuscript received 19 June 1982.



# GREVILLEA MONTIS-COLE SP. NOV. (PROTEACEAE) FROM VICTORIA

by

R. V. SMITH\*

## ABSTRACT

*Grevillea montis-cole*, a new species from western Victoria, is described and its affinities discussed. Two subspecies, *montis-cole* and *brevistyla*, are distinguished.

## DESCRIPTION

***Grevillea montis-cole* R. V. Smith, sp. nov.**

*Frutex* ad 1.5 m altus x 3.6 m latus. Tomentum et ramorum superiorum et foliorum et inflorescentiarum plerumque pilorum patentium vel rectorum vel curvatorum vel torquatorum. *Folia* (1-)2-7(-13.5) cm longa x (1-)2-5(-7.5) cm lata, plerumque longiora quam lata, in (3-)5-12(-22) lobis primariis,  $\pm$  triangularibus ad ellipticis-oblongis profunde dissecta, qui aut simplices aut 1-5 lobos secundarios breves  $\pm$  triangulares habent; quisque lobus primarius secundariusque in aculeum gracile rigidum terminans. Superficies supra foliorum adulescentium vivide viridis, subnitens, paene omnino glabra; superficies infra pallide viridis, hebetata, pilis sparsis plerumque in costa et venis principalibus. *Inflorescentia* racemus secundus, horizontalis ad parum deflexus, 0.6-4 cm longus. *Pedunculus* teretus ad parum angulatus, 0.5-3.5 cm longus. *Bractae floris* maxime variabiles, vel planae vel curvatae vel undulatae, erectae patentessive, ellipticae ad ovate-rhombeae, 1.5-4.5(-5) mm longae x 1-3(-3.5) mm latae. *Pedicelli* (1.0-)1.5-4.5(-5) mm longi. *Perianthium* 6-9(-10) mm longum (de medio toro ad summum arcu) x 1.5-3 mm latum, extus pilosum, intus glabrum, viride ad hinculeum, arcu atropurpureo. *Torus* valde obliquus ad paene rectus, nectario semiannulari prominenti. *Stipes* 1-3 mm longus. *Ovarium* manifeste stipitatum, dense pilosum, pilis longis, erectis ad patentibus. *Stylus* vel 9-13 vel 17-21 mm longus, vivide ruber, vel rectus vel curvatus vel flexus, glaber praeter in base. *Fructus* manifeste stipitatus, 8-14 mm longus x 3-6 mm latus, dense pilosus, pilis brevibus longisque intermixtis.

*Shrub* 0.6-1.5 m high x 0.9-3.6 m wide, decumbent to semi-erect. Distal parts of branches ribbed or angled, sparsely to moderately hairy with straight, curved, waved or twisted hairs, the hairs sometimes loosely appressed but generally strongly spreading. Tips of branches and young leaves densely hairy with ferruginous or reddish-purple hairs. *Leaves*: petioles (2-)3-10(-12) mm long, with a sparse to dense indumentum similar to that of the distal branch-parts; blades broad- to narrow-triangular, truncated-ovate or truncated-elliptic in outline,  $\pm$  truncate to cuneate at the base, (1-)2-7(-13.5) cm long x (1-)2-5(-7.5) cm wide with length ( $<$ -) = or  $>$  width, deeply divided into (3-)5-12(-22) primary lobes; *primary lobes* 0.5-2.5(-4) cm long,  $\pm$  triangular to elliptic-oblong, symmetrically placed in opposite pairs or arranged asymmetrically, either simple or bearing 1-5 short  $\pm$  triangular *secondary lobes*, each ultimate lobe terminating in a slender rigid prickle 1-2.5 mm long. Upper surface of mature leaves bright green, subshiny, almost glabrous except for a few basal hairs; lower surface pale green, dull, sparsely hairy with curved waved or twisted hairs mostly on the midrib and main veins; main midrib and midribs of primary lobes prominently projecting on lower surface. Young leaves mostly glabrous above. *Flowers* in horizontal to deflexed second racemes (0.6-)1.5-3.5(-4) cm long x (1.5-)2-3(-4) cm wide, terminating a terete to somewhat angled peduncle (0.5-)0.7-3(-3.5) cm long. *Peduncle* hairy or partly glabrous, usually with a single bract arising from below to well above the midpoint, occasionally a second bract also present; peduncle usually bent or geniculate at the bract. *Bract* 2-5(-7) mm long, shortly hairy and gently keeled on back, glabrous ventrally, flattish to infolded (sometimes upper margins infolded and the lower spreading or slightly recurved), broad- to narrow-lanceolate with an acute shortly subulate tip, or the tip occasionally trifid or expanded into an incipient leaf with a small lobed lamina. *Rhachis* with an indumentum

\*National Herbarium of Victoria, Birdwood Avenue, South Yarra, Victoria 3141.

*Muelleria* 5(3): 223-227 (1983).

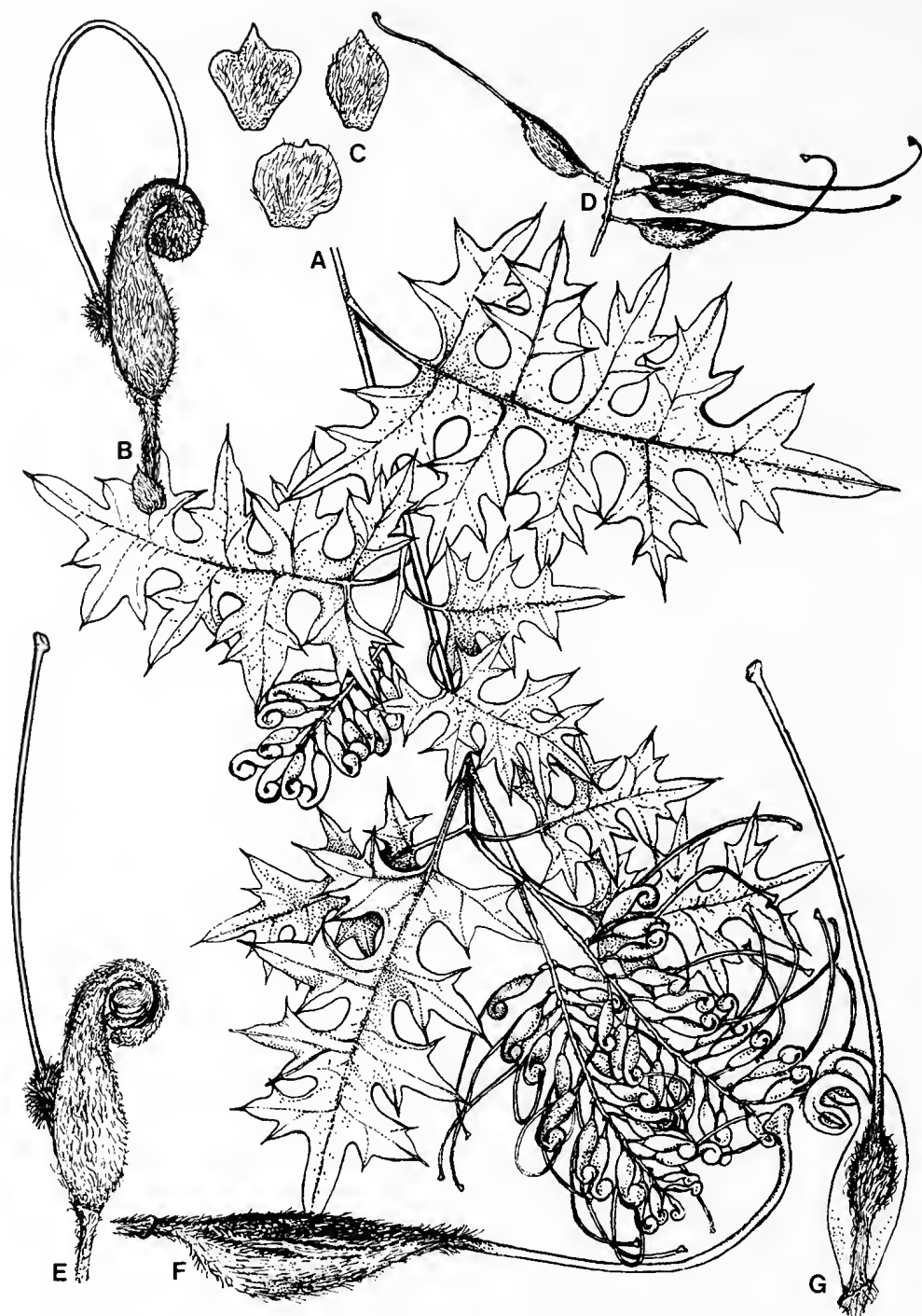


Fig. 1. *Grevillea montis-cole* ssp. *montis-cole*. a — branch showing leaves and flowering racemes, x 1. b — young flower with pollen presenter still enclosed and with floral bract at base of pedicel, x 4. c — floral bracts showing variation in shape, x 8. d — fruiting raceme, x 1. e — mature flower, x 4. f — mature fruit, showing dark longitudinal bands and patches on dorsal and lateral surfaces, x 3. g — section through mature flower, showing oblique torus, stipitate ovary, style and pollen presenter, x 4. a-c, e and g from holotype; d and f from Smith 73/66 (MEL).



similar to that of the distal branch-parts. *Floral bracts* very variable, flat curved or undulate, erect spreading or sometimes reflexed with maturity, elliptic to ovate-oblong to broad-rhombic, from almost truncate and suddenly contracted into a blunt tip to broad-or narrow-acute, 1.5-4.5(-5) mm long x 1.3(-3.5) mm wide with length < to > width, densely to sparsely hairy dorsally with short  $\pm$  spreading hairs, glabrous ventrally, greenish-yellow to reddish-tinged, from sometimes caducous (falling early from flowers) to persistent even in fruit. *Pedicels* (1-)1.5-4.5(-5) mm long (from base to midpoint of torus), straight to curved, spreading to strongly reflexed, from c. half as long as to much exceeding the floral bracts, resembling the distal branch-parts in vestiture. *Perianth* 6-9(-10) mm long (from midpoint of torus to top of arch) x 1.5-3 mm wide, sparsely to densely hairy outside with a mixture of loosely appressed straight or gently waved longitudinally directed hairs and longer spreading waved or twisted ones, glabrous inside; hairs whitish, or those of the limb reddish or pale ferruginous; body of perianth greenish to fawn, the arch blackish-purple or almost black or sometimes light purple, especially inside; external colour partly obscured by the indumentum. *Anthers* (0.7-)0.8-1.2(-1.3) mm long, lemon yellow to pale creamy yellow. *Torus* oblique to almost straight with a prominent semi-annular to bluntly V-shaped nectary. *Stipe* 1-3 mm long, sparsely to densely hairy, with  $\pm$  straight, appressed to spreading, greyish-white to pale ferruginous hairs; stipe arising close to summit of torus, and from slightly shorter to considerably longer than the ovary. *Ovary* prominently stipitate, densely hairy with long, erect to spreading, straight to curved or slightly twisted greyish-white to pale ferruginous hairs. *Style* on flowers (9-)10-12(-13) mm long in ssp. *brevistyla* or 17-21 mm in ssp. *montis-cole*, bright red, straight curved or bent, glabrous except at base where sparsely to strongly hairy, the hairs frequently extending up style for several mm; fruiting styles generally 1-6 mm longer than the flowering styles at least in ssp. *montis-cole*. *Pollen-presenter* (stigmatic disc) greenish yellow, slightly to very oblique, with a broad undulate-crenulate rim rising to a low oblique cone terminated by a rounded or flattish pale cream-yellow stigmatic tip. *Fruit* prominently stipitate, (8-)9-12(-14) mm long x (3-)3.5-5.5(-6) mm wide, asymmetrically ellipsoidal, densely hairy with a mixture of  $\pm$  appressed to spreading straightish hairs and much longer spreading, straight to gently twisted ones; hairs greenish-grey to fawn (sometimes light ferruginous when dry), but blackish-purple in longitudinal bands or patches on the dorsal and lateral surfaces. *Seed* body elliptic in outline, 6.5-8.5 mm long x 2-3 mm wide, dark brown to black, glabrous, smooth or minutely wrinkled, gently convex on outer face,  $\pm$  flattened or depressed on inner face, surrounded by a thin pale yellow wing from 0.5 mm to almost obsolete on the lateral margins, to 1-2.5 mm wide at top and bottom.

#### subspecies **montis-cole**

*Stylus floris* 17-21 mm longus est.

Description and measurements are as given above for the species, except for the restriction of the flowering style length to 17-21 mm. Leaves are mostly longer than wide.

#### TYPE COLLECTION:

Mt Cole State Forest, Glut area, east aspect slopes close to Sandersons Road — Glut Road link, c. 400 m from Glut Road, c. 520 m alt., central-western Victoria (Grid J.14), 9.xi.1965, *R. V. Smith* 65/183 (Holotype: MEL 611505. Isotypes: AD, CANB, K, MEL 611506 and 611507, NSW).

#### SELECTED SPECIMENS EXAMINED:

*Victoria (central-western; Mt Cole State Forest)* — North slopes of Mt Buangor, c. 900 m alt., 16.xi.1970, *R. V. Smith* 70/33 (AD, BRI, CANB, K, MEL 611518 and 9, NSW, PERTH); Glut area, Sandersons Road, c. 520 m alt., 5.xii.1973, *R. V. Smith* 73/66 (AD, BRI, CANB, HO, MEL 611516 and 7, NSW, PERTH); Glut area, near Tunbridges Road, c. 580 m alt., 5.xii.1973, *R. V. Smith* 73/69 (BRI, HO, MEL 611512 and 3, NSW); Saddle between Cave Hill and Mt Sugarloaf, c. 700 m alt., 5.xii.1973, *R. V. Smith* 73/72 (AD, CANB, MEL 611508 and 9, NSW).

#### DISTRIBUTION AND HABITAT:

Apparently confined to the Mt Cole State Forest, north-west of Beaufort, in central-

western Victoria. It occurs on granite formation within an altitudinal range from c. 520 m in the Glut area to c. 900 m on the north slopes of Mt Buangor.

This subspecies occurs in a number of different plant associations which include *Eucalyptus obliqua*, *E. sp.* (Peppermint), *E. nitida*, *E. st-johnii*, *Acacia dealbata*, *A. diffusa*, *A. myrtifolia*, *A. verticillata*, *Bursaria spinosa*, *Correa reflexa*, *Epacris impressa*, *Helichrysum dendroideum*, *Platylobium obtusangulum*, and *Pteridium esculentum* at the lower elevations; at the higher elevations the associations include *Eucalyptus pauciflora*, *E. st-johnii*, *E. dives*, *E. macrorhyncha*, *E. nitida*, *E. goniocalyx*, *Acacia diffusa*, *A. oxycedrus*, *Astrotricha sp.*, *Daviesia ulicifolia*, *Dodonaea cuneata*, *Epacris impressa*, *Helichrysum obcordatum*, *Kunzea parvifolia*, *Leptospermum juniperinum* and *Pultenaea daphnoides*.

subspecies **brevistyla** R. V. Smith, ssp. nov.

Differt subsp. *montis-cole*, stylo floris (9-)10-12(-13) mm longo.

Description of flowering material essentially as for the species except for the restriction of the flowering style length to (9-)10-12(-13) mm. Fruits and seeds not seen. Leaves vary from about as wide as long to a little longer than wide. Younger and intermediate leaves are somewhat more pubescent below than in the ssp. *montis-cole*. Measurements of plant parts usually fall within the lower limits of those given for the species.

#### TYPE COLLECTION:

Mt Langi Ghiran, north facing slope on NE. shoulder along water supply pipe track, c. 850-900 m alt., western Victoria, 37°17'S, 143°07'E, 31.x.1981, *M. G. Corrick 7493* (Holotype: MEL 603607! Isotypes: AD!, CANB!, K!, MEL 603608!, NSW n.v., PERTH!).

#### SPECIMENS EXAMINED:

*Victoria (western; Mt Langi Ghiran)* — Ibidem for type collection, 31.x.1981 *M. G. Corrick 7494* (CANB!, MEL 603609!, NSW n.v.).

#### DISTRIBUTION AND HABITAT:

Apparently confined to Mt Langhi Ghiran in western Victoria, and there known only from a single population on the north-east shoulder.

As with the ssp. *montis-cole*, it occurs on granite formation and apparently occupies a similar habitat to that of the typical subspecies at Mt Buangor. Associated plants recorded are *Dodonaea cuneata*, *Kunzea parvifolia*, and *Astrotricha sp.*

### DISCUSSION

*Grevillea montis-cole* shows closest affinities with *G. steiglitziana* N. A. Wakefield and *G. floripendula* R. V. Smith. These three species have very similar floral bracts, which are either flat, gently curved or undulate, but not concave, and vary in shape from elliptic to ovate, ovate-oblong, or rhombic. Distinguishing characters are given in table 1. The ssp. *brevistyla* shows some approach to *G. floripendula* in the short style, the leaves varying from wider than long to a little longer than wide and also in the tendency to show a noticeable pubescence on the under surface of the leaves, but in all other respects it accords well with *G. montis-cole* ssp. *montis-cole*.

*G. montis-cole* differs from *G. dryophylla* and *G. microstegia* primarily in the floral bracts. The latter two species, discussed under *G. floripendula* in *Muelleria* 4:426 (1981), have floral bracts which are strongly concave, thickened in the lower part and from ovate-rhombic to broad-rhombic.

*G. montis-cole* ssp. *montis-cole* shows considerable variation in leaf size and number of primary lobes, even within a very limited area. This was particularly noticeable in the Glut area near Tunbridges Road, where almost the full range of size and lobe number was found (R. V. Smith nos. 73/68, 76/69, 73/70, 73/71).

Character	<i>G. montis-cole</i>	<i>G. steiglitziana</i>	<i>G. floripendula</i>
Leaves			
number of primary lobes	(3-)5-12(-22)	3-5(-7)	(3-)5-7(-9)
secondary lobes	deltoid, narrowly triangular (longer than wide) to $\pm$ lanceolate, 1-12 mm long x 1-7 mm wide. (Generally longer and narrower than in <i>G. steiglitziana</i> & <i>G. floripendula</i> .)	deltoid to broadly triangular (wider than long, often much wider); (1-)2-8(-10) mm long x 2-8(-10) mm wide.	occasionally narrowly triangular, but mostly deltoid to broadly triangular (frequently much wider than long); 1-6(-8) mm long x 1-5(-8) mm wide
tips of lobes	generally more gradually contracted into a longer spine than in <i>G. steiglitziana</i> and <i>G. floripendula</i> ; spine (1-)1.5-2.5 mm long	generally $\pm$ suddenly contracted into a spine (0.5-)1-1.5(-2) mm long	generally suddenly contracted into a spine 0.5-1.5 mm long
Indumentum			
general	predominantly spreading longish, straight, curved or gently twisted hairs	predominantly appressed straight or gently curved, "directional" hairs	curled or twisted hairs, some loosely appressed others strongly spreading
undersurface of leaves	glabrescent, except for scattered hairs mostly on midrib and main veins	strongly developed	strongly developed
Racemes			
	horizontal or slightly deflexed	horizontal or slightly deflexed	predominantly pendulous, on very slender peducles, occasionally $\pm$ horizontal or deflexed
Flowering style			
length	17-21 mm (ssp. <i>montis-cole</i> (9-)10-12(-13) mm (ssp. <i>brevistyla</i> )	(14)15-20(-21) mm	7-9 mm
colour	bright red	bright red	yellow, greenish-yellow, pale pink to light red

Table 1. Distinctions between *Grevillea montis-cole*, *G. steiglitziana* and *G. floripendula*.

#### ACKNOWLEDGEMENTS

I wish to express my thanks and appreciation to Dr G. A. M. Scott of the Botany Department, Monash University, for preparing the latin descriptions; to Miss A. M. Podwyszynski, National Herbarium of Victoria, for preparing the accompanying illustration; to Mr R. G. Hodges, Director, Crown Land Management, for assistance with locality and altitude details, and for previously escorting me to several of the Mt Cole localities while he was Forest Officer at Beaufort; to Mr C. Ash, National Parks Service, who first brought my attention to *G. montis-cole* ssp. *brevistyla* on Mt Langi Ghiran, and to Mrs M. G. Corrick, National Herbarium of Victoria, for collecting flowering material of this subspecies.









# CONTENTS

## Volume 5, Number 2

	Page
New Australian species of erechthitoid <i>Senecio</i> (Asteraceae) — Robert O. Belcher .....	119
Two Western Australian Hydatellaceae — D. A. Cooke .....	123
A revision of the genus <i>Platylobium</i> Sm. (Papilionaceae) — J. H. Ross .....	127
A revision of <i>Angianthus</i> Wendl., sensu lato (Compositae: Inuleae: Gnaphaliinae), 1 — P. S. Short .....	143

## Volume 5, Number 3

A revision of <i>Angianthus</i> Wendl., sensu lato (Compositae: Inuleae: Gnaphaliinae), 2 — P. S. Short .....	185
<i>Storckiella australiensis</i> sp. nov. (Caesalpiniaceae) from Northern Queensland: a new generic record for Australia — J. H. Ross and B. P. M. Hyland .....	215
<i>Asplenium terrestre</i> and two <i>Asplenium</i> hybrids: new fern records for Australia — P. J. Brownsey .....	219
<i>Grevillea montis-cole</i> sp. nov. (Proteaceae) from Victoria — R. V. Smith .....	223